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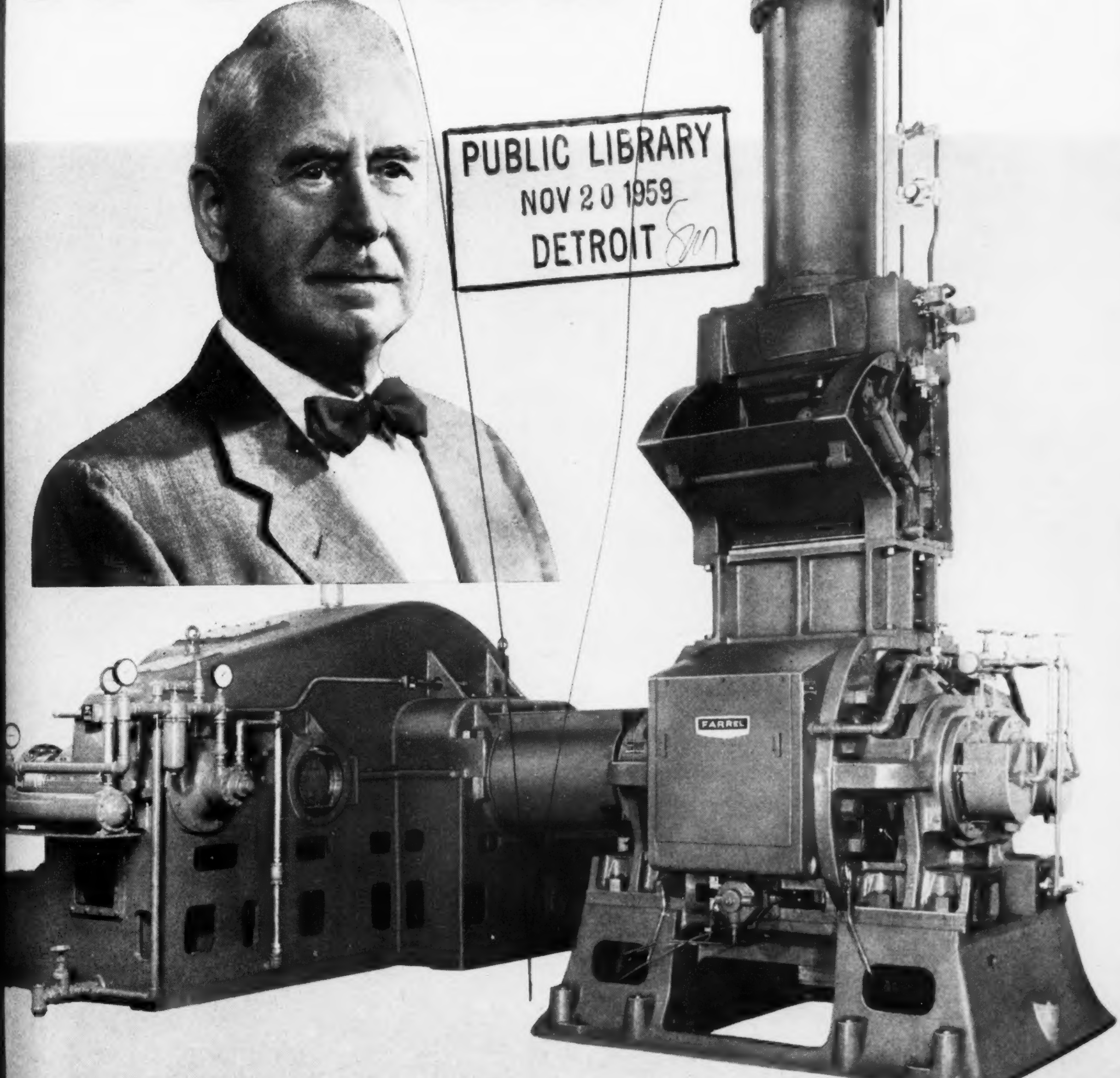

F. H. Banbury Honored at IRC

NOVEMBER, 1959

See page 249

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RUBBER WORLD, November, 1959, Vol. 141, No. 2. Published monthly by Bill Brothers Publishing Corp. Office of Publication, 3rd & Hunting Park Ave., Philadelphia 40, Pa., with Editorial and Executive Offices at 630 Third Avenue, New York 17, N. Y., U.S.A. Second Class Postage Paid at Philadelphia, Pa., under the act of March 3, 1879. Subscription United States $5.00 per year; Canada $6.00; All other countries $10.00. Single copies

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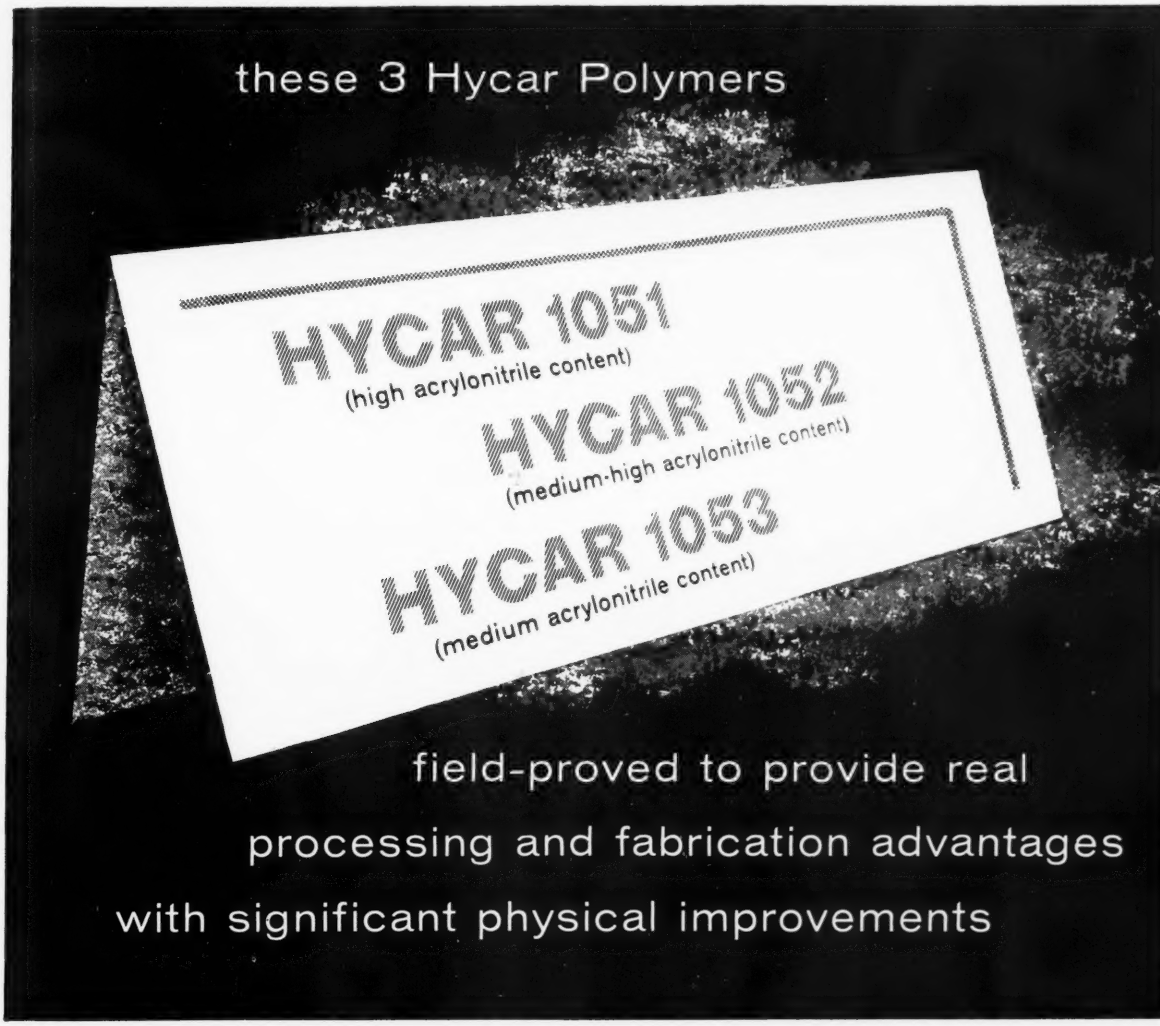

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VOLUME 141, NUMBER 2 NOVEMBER, 1959

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FEATURE DEPARTMENTS

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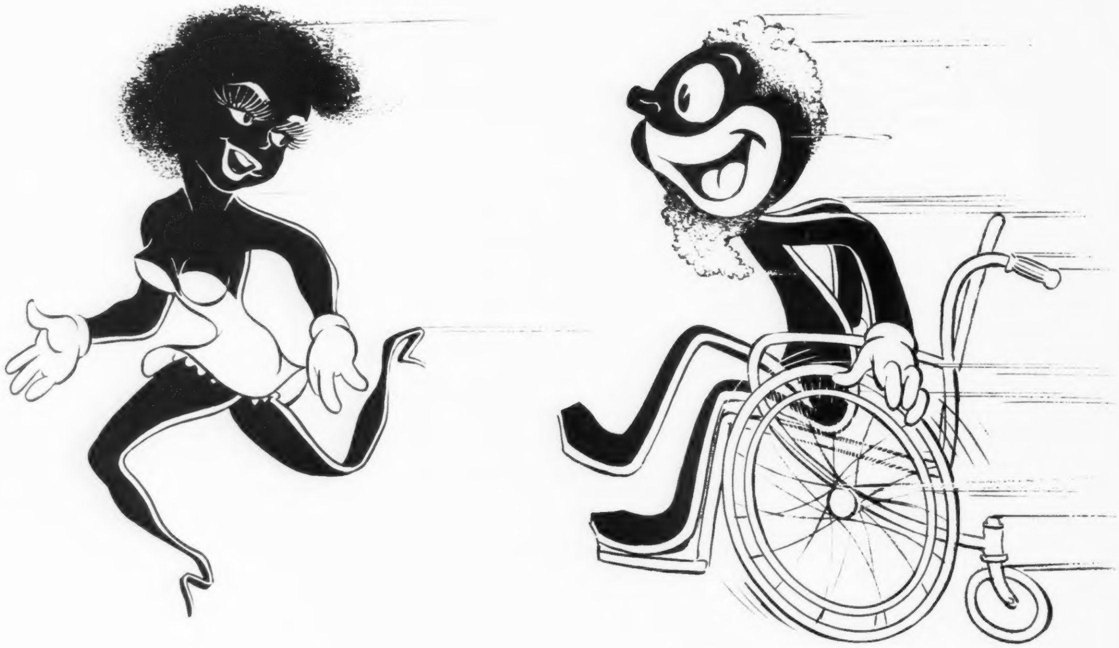

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NEWS of the RUBBER WORLD

The stockpile sales of natural rubber announced recently by both Britain and the United States have failed at the present time to produce any large-scale concern by rubber growers or dealers. With world consumption still running ahead of the current production, the feeling is that it is probably of benefit to both producer and consumer to keep the market in a more stable situation by reducing this deficit.

The Hancock Medalist for 1959 is John Herbert Carrington, of The Anchor Chemical Co., Ltd. The award will be made at the annual dinner-meeting of the Institution of the Rubber Industry, December 17, Birmingham, England. He was selected for his many years of service to the industry and the IRI and particularly for his work on carbon black and factice.

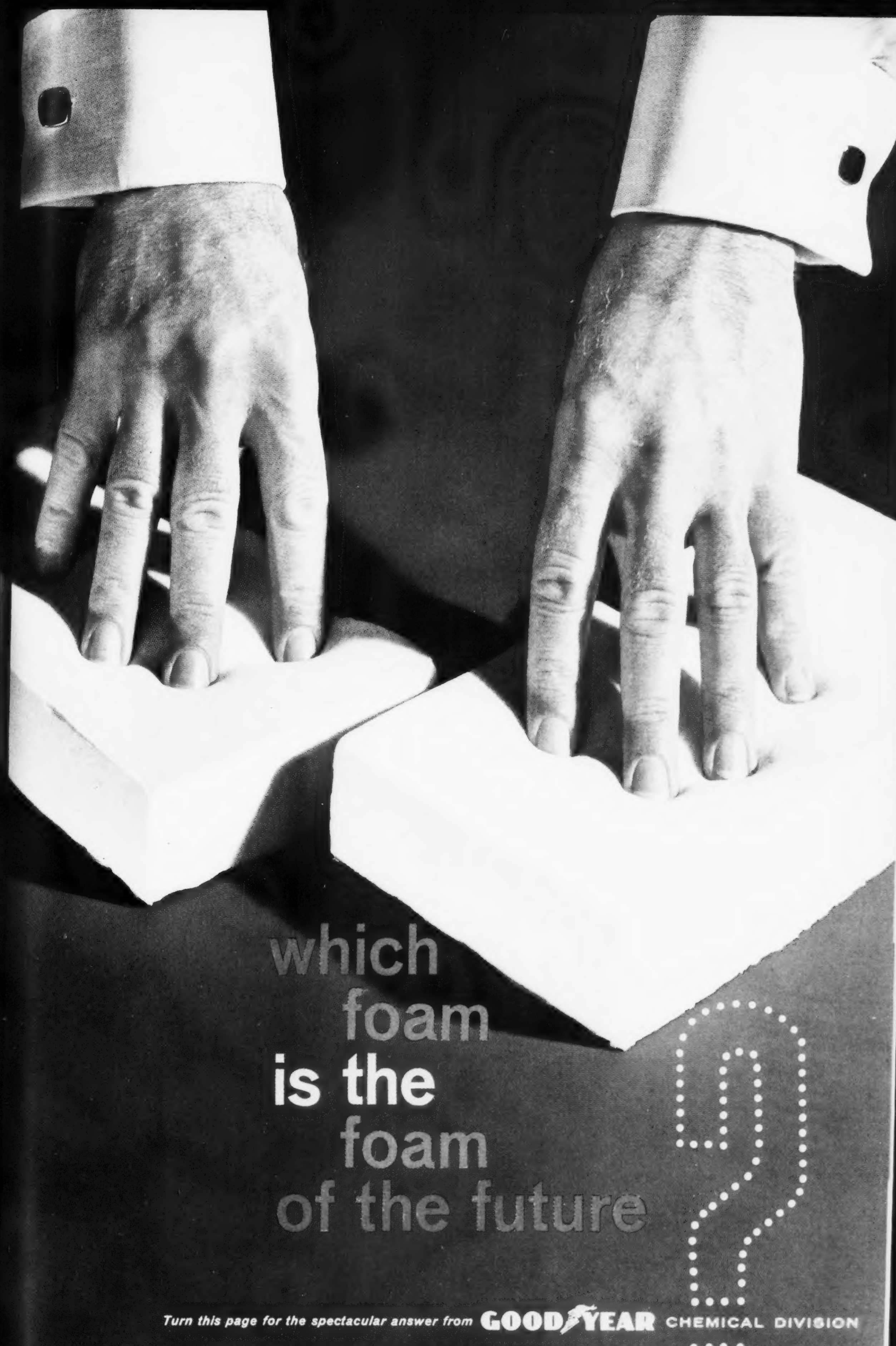
The natural rubber growers in Malaya share the optimism of many in the future of all types of rubber and are making plans to insure increased yields from their plantings. In the test-tube stage are stocks that can produce 25, 000 tons per year per acre, which is far above the 1, 500 to 2, 000 tons expected when current plantings mature in six years.

Wage increases continue to be a feature of new contracts signed by rubber companies, following the trend of the major companies' settlements announced last month. Increases of from 5 to 10¢ per hour were announced by Hodgman Rubber Co., Gates Rubber Co., Windram Mfg. Co., Seiberling Rubber Co., Mansfield Tire & Rubber Co., and Electric Hose & Rubber Co.

A new technical center has been opened by Union Carbide Corp. at South Charleston, W. Va. The new center consists of three major buildings and nine others containing supporting facilities. With its own libraries, cafeterias, phone system, and mail distribution, the center is considered a nearly self-sufficient science city of 100 acres.

76-A

ORLD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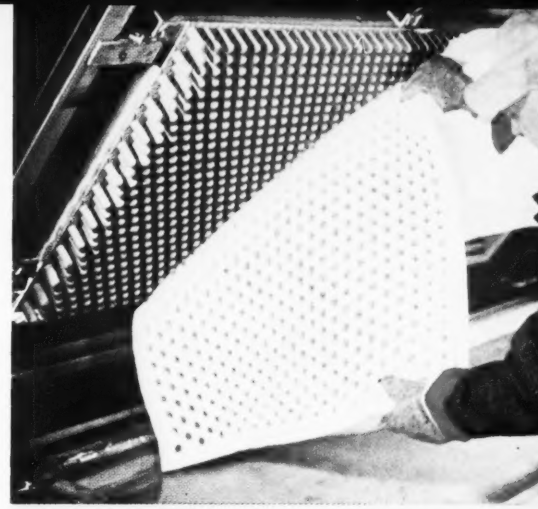


9 Very good hysteresis and resilience properties

10 Stress strain properties that are more than adequate for virtually all cushioning applications

11 Low temperature properties that rank second only to natural rubber latex foam

Table I lists the typical properties of PLIOLITE LATEX 5352. Table II compares the properties of foam made with PLIOLITE LATEX 5352 to those of foam made with natural rubber latex.

The charts below are further evidence of the excellent properties of foam made with PLIOLITE LATEX 5352 as compared to natural rubber foam.

But neither the tables nor the charts depict the most important advantage of PLIOLITE LATEX 5352—the much greater assurance of product uniformity and price stability than could ever be possible with a natural product.

(Table II)

PHYSICAL PROPERTIES OF FOAM RUBBER CORE STOCKS

Properties	100% Natural Latex Foam	100% PLIOLITE LATEX 5352 Foam
Tensile strength, psi.[a]	15.0	9.0
Elongation, %[a]	310	225
Compression set[b] (% retention of gauge)		
50% deflection	92.7	96.6
90% deflection	90.0	96.0
Hysteresis loss, %	25.0	26.5
Resilience (rebound in %)[c]	73.0	69.0
Low temperature properties[d] (% change @ −20° F.)	10.4	11.0
Flammability[e]	burns	burns

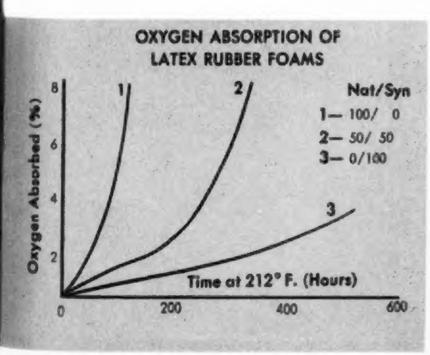
a The tensile and the elongation values of the foam rubber specimen were made on a ½-inch thick cross-section dumbbell specimen, using an inclined plane IP4 tester made by Scott Testers, Inc., Providence, R. I.

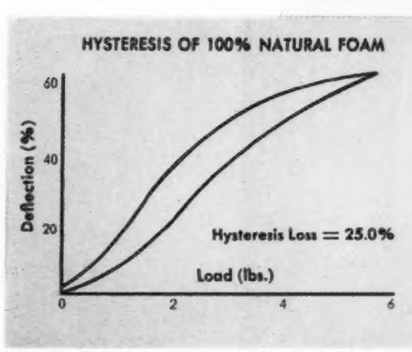
b ASTM D 1055-58T.

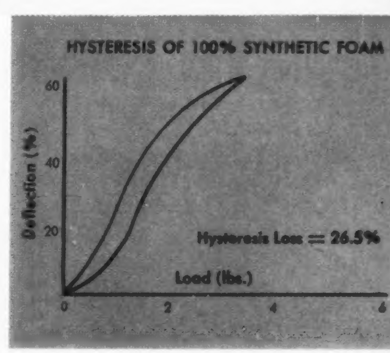
c The resilience was determined by dropping an 8.3 gram steel ball of 1.26 cm. diameter from a height of 20 cm. onto a one-inch-thick sample of slab stock and determining the % rebound of the ball.

d ASTM D 1055-58T, except that temperature was maintained at −20° F. instead of the specified −40° F.

e Flammability was determined by igniting the end of a one-inch-wide by ½-inch-thick slab of foam rubber with a Bunsen burner.







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TECHNICAL BOOKS

BOOK REVIEWS

"Silicones." Robert N. Meals and Frederick M. Lewis. Cloth, 5¼ x 7½ inches, 276 pages. Reinhold Publishing Corp., New York, N. Y. 1959. Price $5.95.

This book's scope includes the manufacture, properties, and applications of the silicones, with data on the properties of silicone resins, fluids, and rubber at high temperatures. It is aimed primarily at design engineers, formulators, and manufacturers in all industries who might have interest in silicones as engineering or raw materials.

The book, the eleventh of the Reinhold Plastics Application Series, contains case histories of present industrial applications, and suggests many new applications. These include the uses of silicones as chemicals, rubbers, resins, fluids, greases, adhesives, sealants, surface coatings, etc. Here is a concentrated summary of the technology and applications of silicones.

The authors, with the silicone products department of General Electric Co., have attempted to make this a readable book, and only enough technical background has been included to make the book reasonably self-contained. It is not an exhaustive reference, although a limited bibliography is included. Because of the great number and variety of applications, many had to be omitted, and others were treated very briefly. Some history, and a look into the future, are added to give the account perspective. The bibliography is short, intended only to guide the reader toward the thousands of publications and patents dealing with silicones.

The contents include introduction, general properties, basic chemistry, manufacture and fabrication, application of silicones, future prospects of silicones, appendix: organosilicon compounds, bibliography, and index.

"Oral Communication of Technical Information." By Robert S. Casey. Cloth, 5¼ by 7½ inches, 204 pages. Reinhold Publishing Corp., New York, N. Y. 1958. Price $4.50.

This very useful handbook for speakers in the technical field has been written by a man with extensive experience in technical communications who is, nevertheless, a technical man himself. It covers organization of material, composition, delivery of formal and impromptu speeches, and the use of mechanical aids such as recordings and slides.

This book begins with the bridges and barriers to effective communication and then takes up the actual problems involved and how they are solved. Included are sections on how to preside at meetings, talk science to laymen, give technical legal testimony, and even social conversation. Emphasis is on the special needs of technical communication, but, of course, the basic techniques are common to any speaking event.

Throughout the book many faults common to many engineers and chemists are brought out, and methods for avoiding them are presented. There are also many references to other sources for added reading on most of the subjects covered.

•

"Nopco Chemicals for Latex Compounding." Nopco Chemical Co., Newark, N. J. This technical data bulletin describes Nopco's complete line of latex-compounding chemicals, most of which are nonionic or anionic surfactants. These chemicals include thickeners, stabilizers, dispersing and wetting agents, antifoamers, and tackifiers. These chemicals can be employed in most synthetic latices and their blends.

Technical Books

NEW PUBLICATIONS

"Electrical Grade Casting Compounds from Solithane 113 Casting Resin." Bulletin S-113-3A. Thiokol Chemical Corp., Trenton, N. J. 8 pages. This bulletin describes the physical and electrical properties of electrical grade compounds in the Solithane 113 urethane casting resin series. The bulletin, which has been revised and expanded, includes new formulations of Solithane 113 and catalysts. The new formulations, requiring no plasticizers, give electrical grade compounds abrasion and impact resistance, plus excellent electrical properties, throughout a hardness range of from 15 Shore A to 70 Shore D.

Publications of the chemical division, The Goodyear Tire & Rubber Co., Akron, O.:

"Plioflex 1500C." Tech-Book Facts PF-27. 4 pages. This data sheet describes technical data on Pliofiex 1500C, a general-purpose cold SBR said to exhibit appreciably higher physicals than can be obtained with most hot polymers. Pliofiex 1500C is stabilized with Wing-Stay 100, a combination stabilizer-antioxidant-antiozonant.

"Pliofiex 1712C." Tech-Book Facts PF-26. 4 pages. The raw polymer properties, static and kinetic ozone testing results, and vulcanizate properties of Pliofiex 1712C are given. Pliofiex 1712C is described as a cold SBR polymer extended with 37.5 parts of highly aromatic oil and stabilized with Wing-Stay 100.

"Chemigum N600 Pigmentation Study." Tech-Book Facts CG-41. 12 pages. This bulletin provides a quick preliminary reference for selecting a suitable filler for cold nitrile polymer applications. Various black and non-black fillers have been compounded, and vulcanizate comparisons are presented in tabular form. Comparison of physical properties is also included.

"Pliofiex 1713 Pigmentation Study." PF-25. Tech-Book Facts, 8 pages. Results of an evaluation of the effects of various non-black and black pigments on Pliofiex 1713 are tabulated in this bulletin. Pliofiex 1713 is a light-colored cold rubber extended with 50 parts of a non-discoloring, non-staining oil. It is suggested for use in soles, heels, toys, housewares, flooring, sporting goods, and drug sundries.

Publications of B. F. Goodrich Chemical Co., Cleveland, O.:

"Properties of Hycar 1203." Hycar Technical Newsletter, Vol. VIII, No. 2. 16 pages. This newsletter gives the properties of Hycar 1203, a prefluxed blend of 70 parts of Hycar nitrile rubber and 30 parts of Geon polyvinyl chloride. Included are formulations of Hycar 1203 in compounds for electrical cords, uni-cellular shoe soles, shoe-sole adhesive, standard shoe soles, fuel lines, face masks, and light-colored stocks.

"Making Cements with Hycar Rubber." Manual HM-4. 34 pages. This booklet describes the use of Hycar nitrile rubbers in cements. Sections include: milling and processing the polymers; compounding; typical Hycar cement properties; selecting a solvent; cement; specific applications; special-purpose cements; cements with Hycar rubber and resins; bonding to metal with Hycar rubber cements; and Hycar 1702 carboxylic nitrile rubber in cements.

"How to Thicken Latices with Carbopol 934." This bulletin describes the advantages of using Carbopol 934 as a latex thickener. Carbopol 934 is a carboxy vinyl polymer of high molecular weight which is supplied in the form of a fluffy, white acid powder. The bulletin's sections include applications, concentration, formulating methods, and compounding suggestions.

"Estane Polyurethane Materials." Service Bulletin G-18. 18 pages. This bulletin details technical data on Estane 5740x1, a poly (ester-urethane) elastomer which is believed to be an essentially linear polymer. Included are sections on physical and chemical properties, solubility, compounding, processing, and applications. Estane 5704x1 offers excellent high-level physical and chemical properties, without the necessity of curing. The bulletin also gives limited information on Estane 5740x2, a low-modulus version of 5740x1.

Technical Books

"Acrolein—Its Chemistry and Its Applications." Shell Chemical Corp., New York, N. Y. 24 pages. This technical bulletin describes many chemical reactions of acrolein with other chemicals. Homopolymers and copolymers are discussed, including references to rubber-like copolymers obtained by polymerizing acrolein with chloroprene or bromoprene. Physical properties of acrolein and recommendations for its safe handling in the laboratory are presented.

"Logosols—Liquid Polyvinyls for Industry." Bee Chemical Co., Chicago, Ill. 16 pages. A liquid polyvinyl plastic that sets with heat, known as Logosol, is described along with detailed information on its application and use. The material may be used by hot or cold dipping; hollow or solid casting; and knife, roller, or spray coating. Also described are Logogels which are Logosols to which have been added certain specific gelling agents. These change the unfused form from a liquid to a gel closely resembling modeling clay.

"RTV Silicone Rubber." Bulletin CDS-170A. Silicone products department, General Electric Co., Waterford, N. Y. 12 pages. Product and application data on the complete line of RTV (room temperature vulcanizing) silicone rubber compounds are presented. The bulletin contains up-to-date information on product properties and data for RTV compounds —20, —40, —60, —90 and new silicone rubber sponge. Also featured are suggestions for handling RTV compounds, curing and viscosity characteristics, and information on RTV primers for bonding applications.

Publications of the elastomer chemicals department, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.:

"Continuous Vulcanization of Neoprene Extrusions in Liquid Curing Media." BL-357. By M. A. Schoenbeck. 12 pages. This bulletin describes a method for continuously curing neoprene extrusions by passing them from the extruder into a curing tank where they are immersed in a liquid curing medium (LCM) at temperatures of 400 to 600° F. Equipment, heat transfer media, compounding, extruded neoprene sponge, and applications are discussed.

"Use of Sulfur to Increase Tensile Strength of Neoprene Type WB." BL-358. By G. K. Walker. 4 pages. The addition of elemental sulfur to a Neoprene Type WB compound is shown to increase tensile strength by 20%. Four different formulations are presented, together with vulcanizate properties, in tabular form.

"Zalba Special." Report No. 59-3. By R. W. Bell and D. W. Gorman. 8 pages. Zalba Special, a non-staining, non-discoloring antioxidant (a fortified hindered phenol) in powder form, is described. Vulcanizate characteristics and processing characteristics are detailed in graphical and tabular form.

"The Effect of Neoprene Modification of Asphalt on the Skidding Characteristics of Surface Treated Roads." 6 pages. This report gives the details of a study the purpose of which was to compare the stopping distance of an automobile under locked wheel skid test conditions at various speeds on a neoprene modified asphalt surface treated road and a control road of unmodified asphalt. It was concluded that the distance required to stop the test car was shortened by neoprene modification of the asphalt road surface.

Publications of The Dow Chemical Co., Midland, Mich.:

"Choosing the Right Polyglycol." 24 pages. This bulletin lists for 40 polyglycols the formula, description, average molecular weight, specific gravity, pounds per gallon, refractive index, and viscosity in centistokes. Descriptive and use information is included for each of these polyglycols.

"Ethylene Amines." 65 pages. The contents of this book cover properties, reactions, uses, first-aid techniques, handling and storage, property graphs, and a bibliography of patent and use sources. In the rubber industry, ethylene amines and their derivatives are used as activators, catalysts, short-stopping agents, curing agents, stabilizers, and modifiers in the polymerization and vulcanization of natural and synthetic rubber.

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Technical Books

Publications of Merck & Co., Inc., Rahway, N. J.:

"'Maglites' in Vitons." Bulletin No. 5914A. 8 pages. This bulletin describes the evaluation of the performance of different grades of magnesium oxides in Vitón A and A-HV synthetic rubbers and shows the importance of selecting the right grade of magnesia. Vulcanizate properties are presented in graphical and tabular form.

"'Maglite K' in Butyl White Sidewalls." Bulletin No. 5904A. 7 pages. "Maglite K," a specially calcined magnesia, when compounded in light-colored butyl compounds, is shown to protect the compound against deterioration due to ultra-violet radiation. This magnesia, moreover, will either prevent or reduce surface tack and the attendant disadvantages in butyl white sidewall tire compounds. Formulations and vulcanizate properties are given.

Publications of the Office of Technical Services, United States Department of Commerce, Washington, D. C.:

"English Abstracts of Russian Technical Journals." 5 pages. This listing shows some 100 Soviet technical periodicals abstracted regularly by U. S. Government agencies and released to the public through OTS as part of its program of collection and dissemination of translated technical literature. The periodicals cover such fields of research as aeronautics, astronomy and mathematics, chemistry and chemical engineering, civil and electrical engineering, fuel and power, geography and geology, mechanical engineering, mining and metallurgy, physics, and general science and technology.

"Commercial Standards." 12 pages. This new index lists all commercial standards under 22 classifications including apparel and apparel sizing; chemicals; electrical and mechanical equipment; hardware; instruments and tools; heating; ventilating and refrigeration; household and hospital supplies; lumber and wood products; millwork; paper and petroleum products; plastics; plumbing materials and fixtures; pipe and fittings; precious metals; rubber products; textiles; and thermal insulation materials.

Publications of Dow Corning Corp., Midland, Mich.:

"Silastic Notebook—Table of Contents." This table of contents page, dated July, 1959, supersedes the previous one, dated May, 1959.

"Silastic Stocks and Pastes." 1 page. This sheet lists currently available Silastic stocks and pastes. They are classified by properties and uses.

"Wilson Industrial Glove Catalog." No. WR-459-28. The Wilson Rubber Co., industrial division, Canton, O.

"Marvinol VR-31"; "Marvinol VR-33"; "Marvinol VR-34." Naugatuck Chemical Division, United States Rubber Co., Naugatuck, Conn.

"Garlock Metal Packing for Pumps, Engines and Compressors." Bulletin AD-166. The Garlock Packing Co., Palmyra, N. Y.

"Thixon Summary." #03-1-8-5-59. Harwick Standard Chemical Co., Akron, O.

"Adjustable-Speed Drive Equipment for Calenders." Bulletin GEA-6910. General Electric Co., Schenectady, N. Y.

"Durez Plastics." No. D400. Durez Plastics Division, Hooker Chemical Corp., North Tonawanda, N. Y.

"Chemical Reactions Induced by Polymer Deformation"; "Aging of Natural Rubber Vulcanizates in the Presence of Dithiocarbamates"; "The Nature of the Cross-Links in Tetramethylthiuram Disulfide-Zinc Oxide-Natural Rubber Vulcanizates"; "Internal Rupture of Bonded Rubber Cylinders in Tension"; "The Rupture Process in Carbon-Loaded Rubbers: An Electron-Microscopic Investigation"; **Natural Rubber Compounds for High-Temperature Service"; "Cis-Trans Isomerization in Polyisoprenes—**Part 2"; **"Mastication of Rubber—**Part 8: Preparation of Block Polymers by Mechanical Shear of Polymer-Monomer Systems"; **"Stress Relaxation during the Thermal Oxidation of Vulcanized Natural Rubber"; "γ-Irradiation of Rubber and Styrene. Graft Polymer Formation"; "Metal Dialkyldithiophosphates as Retarders of the Oxidative Degradation of Natural Rubber."** The British Rubber Producers Research Association, Welwyn Garden City, Herts, England.

Photo courtesy Beebe Rubber Company, Nashua, N. H.

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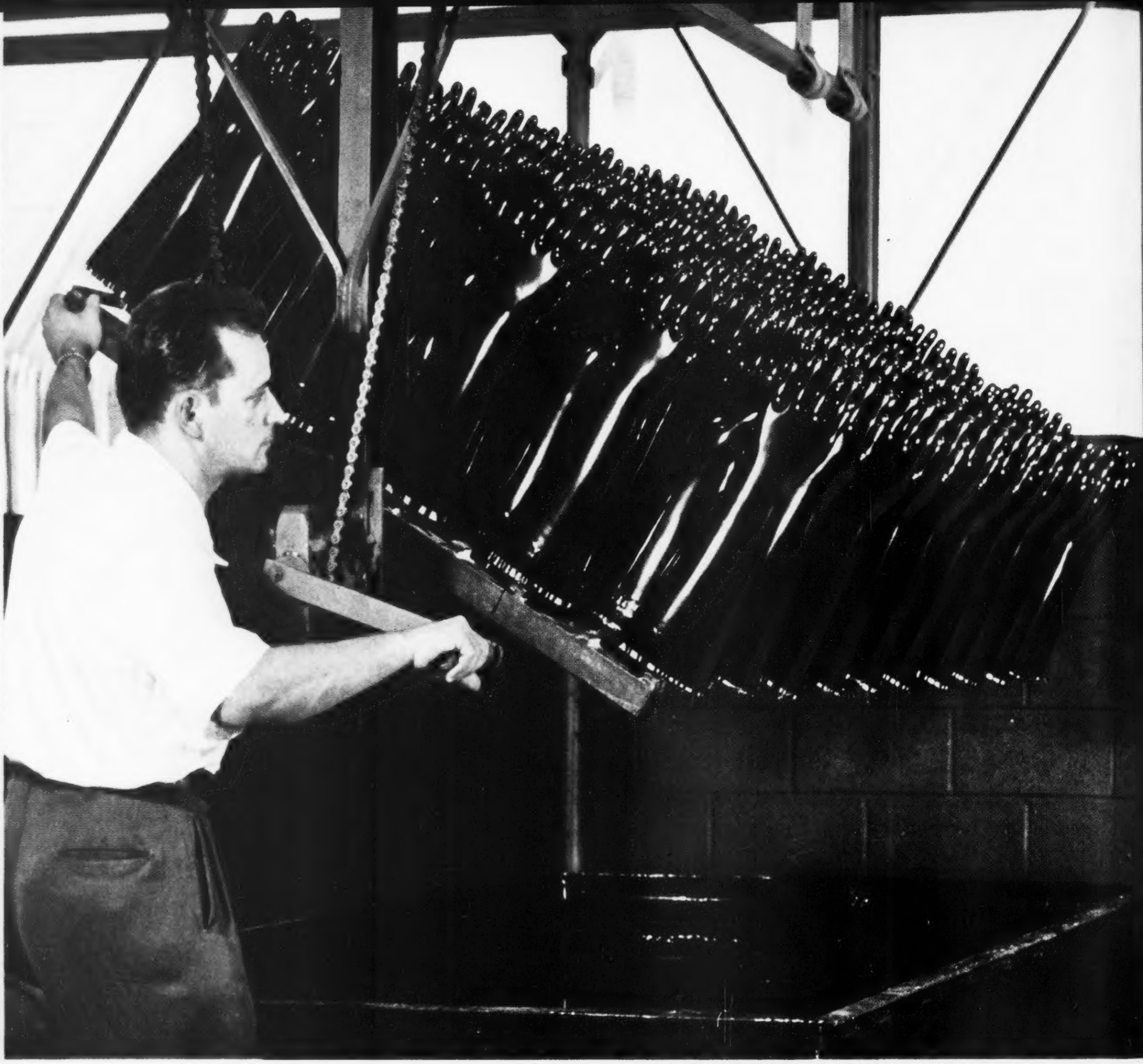

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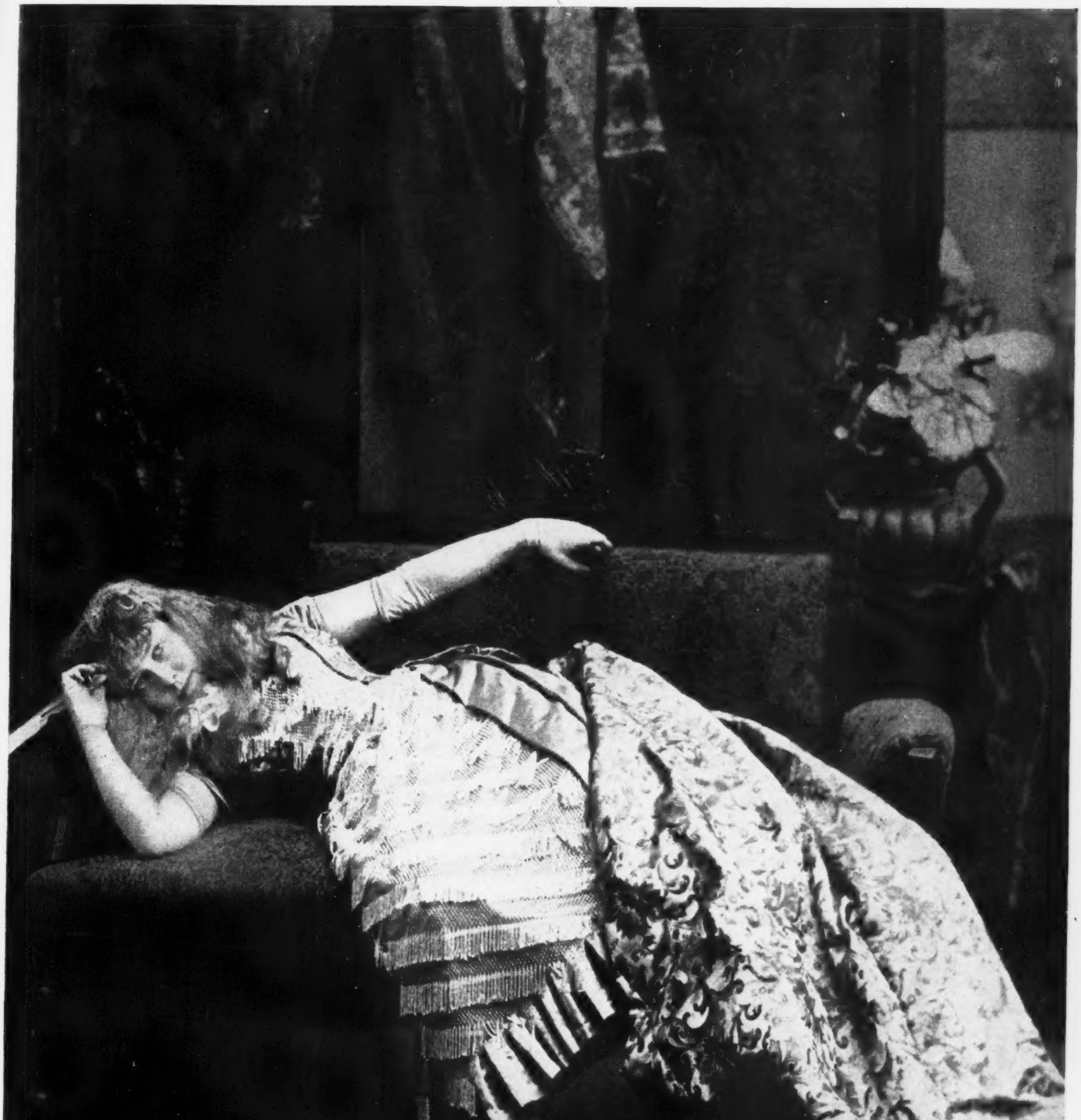

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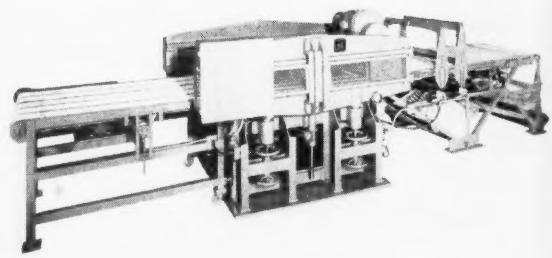
NEW EQUIPMENT



New Model 11103 automatic roller die cutter

Femco Model 11103 Die Cutter

Falls Engineering & Machine Co., Cuyahoga Falls, O., has introduced a smaller size of its big automatic roller die cutter. The new unit, designated Model 11103, is equipped with an automatic roll feed device and a discharge conveyor takeaway. The first of these new models made was also equipped with a quick-change die holder which reduced the time necessary for die changes to 10 minutes. On one test run of the new model, die cutting foam-rubber insoles for playshoes, the machine cycled 10 times per minute.

This new model has a pinch bar feed which will accommodate a roll of material 40 inches wide, and the die cutter bed is 39 inches long. The feeding mechanism stroke can be regulated anywhere from six to 39 inches.

Most of the material die cut on this unit is reported to be very flexible, and for that reason the pinch bar feed was designed to push, not pull, the material on to the bed of the die cutter. This design eliminates the possibility of stretching material during the die cutting operation.

The newly designed discharge conveyor is attached to the output end of the conveyor and carries the die-cut pieces to a convenient unloading position.

Several rolls of polyether foam 1⅜ inches thick have been processed through the machine during test runs, and the scrap or web between indexes was held to ¼-inch. Pieces were die cut with true vertical edges by using Femco's vertical die handler equipment which precompresses the stock in cutting position.

D-S Hi-Speed Take-Up

Wire speeds up to 4,000 feet per minute are said to be possible on an all-new high-speed take-up for insulated wire, now available from Davis-Standard, division of Franklin Research Corp., Mystic, Conn.

The dual-reel take-up, Model DR-24HS, is specifically designed for continuous reeling of the lighter-gage wires. Handling reels from 12 to 24 inches in diameter, this D-S take-up features automatic cut-over to the empty reel without any reduction in speed.

All operations for loading and unloading of reels are power controlled to eliminate lifting and pushing of reels by the operator. Reels are pneumatically raised and lowered, and the pintles on which the reels are mounted also retract and engage pneumatically. A newly designed friction-disk drive eliminates hunting for dog pin holes during reel loading.

(Continued on page 188)

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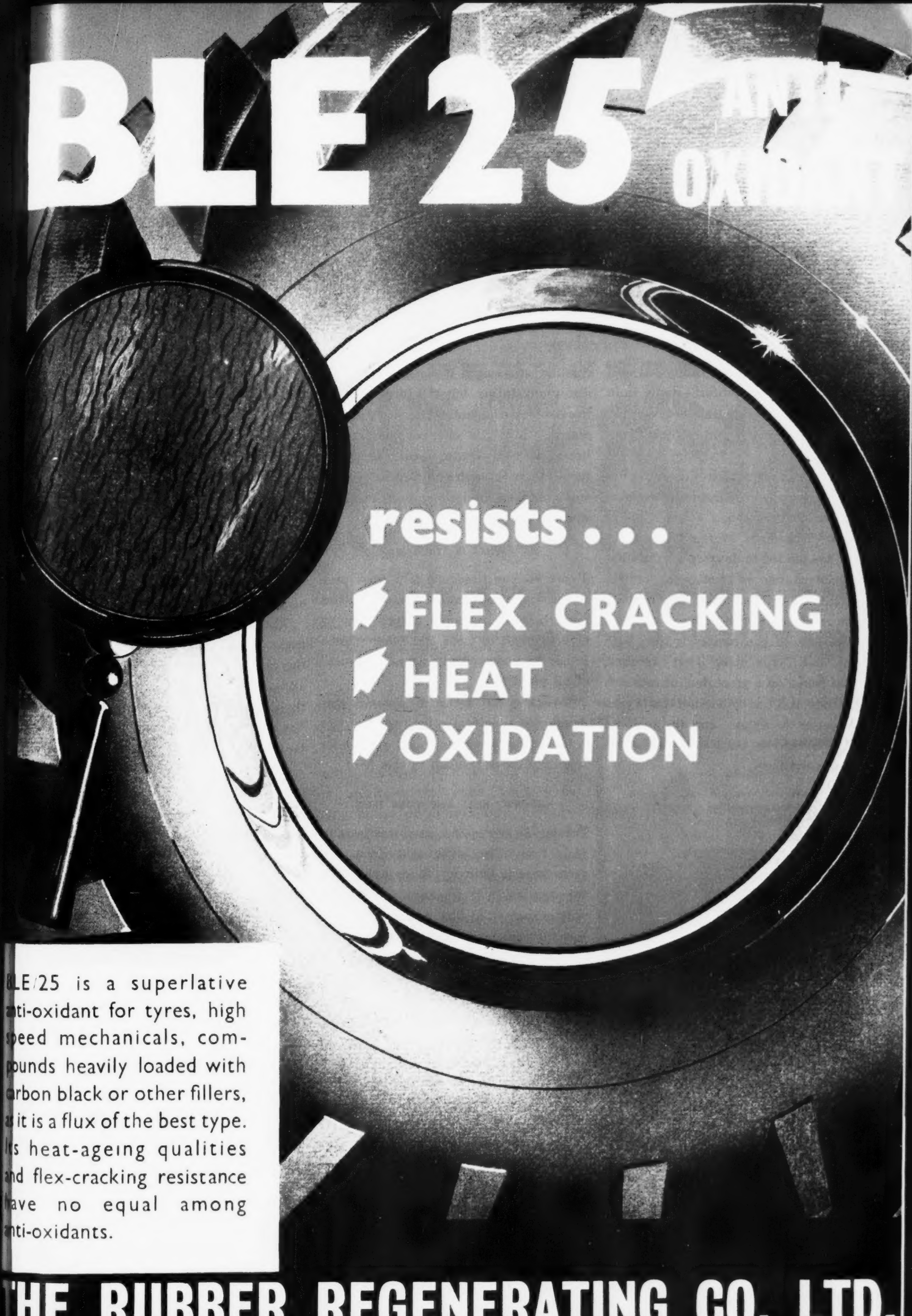
BLE 25
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FLEX CRACKING
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LE/25 is a superlative ti-oxidant for tyres, high eed mechanicals, com-ounds heavily loaded with rbon black or other fillers, it is a flux of the best type. s heat-ageing qualities d flex-cracking resistance ave no equal among ti-oxidants.
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RAFFORD PARK · MANCHESTER 17 · ENGLAND
ONE: Trafford Park 1424/8 (5 lines). 'GRAMS: "Regenerate". CODE: Western Union Telegraph, Universal Edition

What's behind the big battle about tire safety?

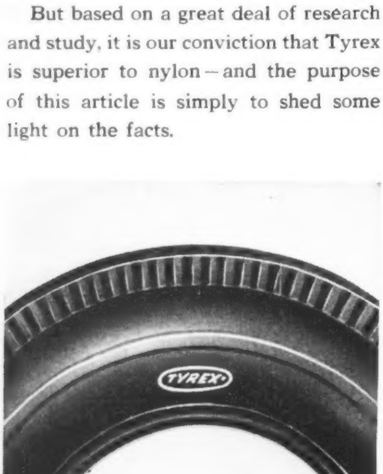
TYREX*

THE battle about tire safety—as well as tire riding comfort—stems from a competitive struggle between the older tire cord, nylon, and the new Tyrex viscose tire cord.

The people engaged in this battle, on both sides, are sincere businessmen with no more complicated a desire than to sell good products at fair prices. But there has tended to develop a somewhat active exchange of challenges, claims and counter-claims, which has become quite confusing to tire buyers.

The fact of the matter is that *both* nylon and Tyrex make good tire cord.

But based on a great deal of research and study, it is our conviction that Tyrex is superior to nylon—and the purpose of this article is simply to shed some light on the facts.



***TYREX is a collective trademark of TYREX INC. for viscose tire yarn and cord.** The following producers are licensed to identify their viscose tire cord as meeting the standards of Tyrex Inc.: American Enka Corporation, American Viscose Corporation, Beaunit Mills, Inc., Courtaulds (Canada) Ltd. and Industrial Rayon Corporation.

WHAT IS NYLON?

Nylon is a man-made fiber derived from coal, air and water. It can be fashioned into many forms, but the form used in tire cord is a filament. Nylon is a thermoplastic—that is, it changes characteristics under heat. Under normal temperatures nylon is tough and flexible. Nylon was first used in clothing and later as a tire cord.

WHAT IS TYREX?

Tyrex viscose tire cord is a fiber produced from cellulose. Cellulose is the basic building material nature uses to give strength to trees and other plants. It has been described as the "skeleton" of all plant life.

Tyrex is *not* a thermoplastic, was developed specifically for use as a tire cord and has been described as a major scientific break-through in this field.

HIGHWAY HEAT AND YOUR TIRES

Driving at any speed generates heat in your tires. The faster you drive, the more heat is built up. Since nylon is a thermoplastic, it weakens under high temperatures—in fact, get the temperature high enough and nylon *melts*.

Tyrex viscose tire cord, on the other hand, is not a thermoplastic and cannot possibly soften or melt. Some tests tend to show that Tyrex actually gets stronger as highway heat builds up, but this, in our opinion, has not been definitely established.

CHUCK-HOLES, STONES AND THE LIKE

It was originally believed that nylon tires could withstand damaging impacts better than tires made with Tyrex tire cord. But this belief was based on the results of an older industry test in which tire cord was put under great strain for periods of from 15 to 18 seconds.

Then someone realized that this was not realistic since even the slowest driver among us takes only a fraction of a second to strike a chuck-hole or stone in the road. So a new testing machine was developed by the tire industry to put severe strain on tire cord for only a very brief .005 second.

The results of the new test were dramatic. Tyrex was 35% stronger than in the old "slow" tests while nylon proved 16% weaker. The difference was more than enough to show that Tyrex viscose tire cord is definitely the stronger of the two under actual impact conditions.

"CHUNK-OUT"

When tires are driven at very high speeds, a failure occurs that is called "chunk-out." It is caused by the severe distortion of the tire, and chunks of rubber actually break away from the tire and are thrown free.

In special tests run at 105 to 108 miles per hour, tires made with Tyrex viscose tire cord averaged *twice* as much mileage as did nylon tires of identical tread design and construction—and even with this greater mileage, Tyrex developed only $\frac{1}{4}$ as much tread "chunk-out." (Perhaps the most important lesson for speed-loving motorists to learn is that *both* tires developed some chunk-out: passenger-car tires are just *not* built for such excessive speeds.)

VS. NYLON

DO YOU RETREAD YOUR TIRES?

One of the extensive tests used to compare nylon cord and Tyrex cord was the use of both types under carefully controlled conditions on a large fleet of New York taxicabs. This test was designed to determine retreadability of the two types, and more than 15,000,000 tire miles were accumulated under actual driving conditions.

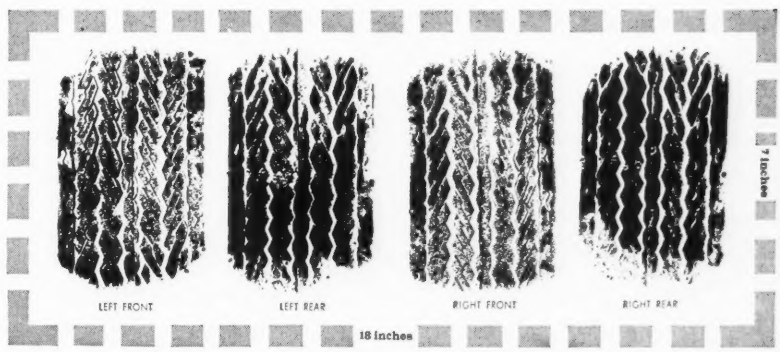
Tyrex viscose cord tires gave between 10% and 11% more mileage on their original treads, and an average of 94% were suitable for recapping compared with only 84% for nylon. Project these figures over the number of miles you drive, and you can see that considerable savings can result from driving on tires made with Tyrex.

WHICH TIRE IS QUIETER?

Even the most partisan supporters of nylon agree that Tyrex is quieter. Nylon tires tend to whine, and to some people this noise is objectionable. It is easy to spot the quieter-running Tyrex on the highway.

"MORNING THUMP"

Nylon tires, because of their very nature, tend to form flat spots where the car has been standing overnight. These spots stay in the tires for a varying length of time after you begin driving in the morning. And you will hear and feel a definite "thump." To some people this is no problem; others dislike the noise and vibration. Tires made with Tyrex stay round and stable, a fact you can easily demonstrate for yourself.



These prints were made by inking the tires of an ordinary passenger car and then lowering the car onto sheets of paper. It was done to dramatize the fact that your safety, comfort and total car investment ride the road on little more area than is covered by your own two feet. Obviously you have real reason to be concerned about the strength of your tires. This article discusses tire strength.

WHAT DOES THE DIFFERENCE IN COST MEAN?

Nylon is often referred to as the "premium-priced" cord because tires made with nylon cord cost more than the same tire made with Tyrex. This is not because nylon is somehow better – although some Americans tend to believe that if a thing costs more, it must be better. Nylon is more expensive than Tyrex simply because it costs more to make it. Cashmere costs more to make than nylon, but it would produce a ridiculously poor tire cord.

WHAT'S THE CONCLUSION?

Which should you buy? We buy tires made with Tyrex, naturally. Which you buy is, of course, up to you. But may we point out that every make of the new 1960 automobiles is equipped at the factory with tires made with Tyrex viscose tire cord. We would like to suggest that you do as the professional auto makers did (after their own tests) – specify TYREX.

Who is Rayonier?

Rayonier is a leading world supplier of chemical cellulose, the basic material from which many familiar American and foreign products are made: photographic films, cellophane, cigarette filters, rayon, sponges, explosives, plastics, sausage casings and thousands of others, including the new Tyrex viscose tire cord.

In addition to extensive tree farms and plants in the U. S. and Canada, Rayonier operates three modern research centers where cellulose is the object of intense and continuous study. We began several years ago – working with our customers – to help develop the tough new tire cord known as Tyrex, and today we produce large quantities of a very special, high-quality cellulose for this purpose.

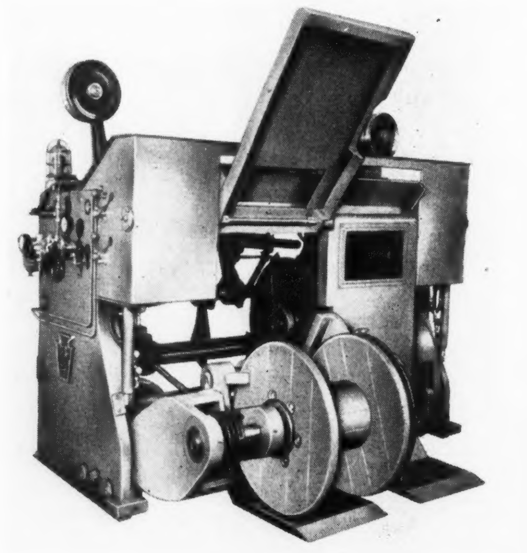
It is Rayonier's conviction that the information in this article presents the facts as research by ourselves and others – including independent testing companies – have shown them to be.

RAYONIER

NATURAL RESOURCES CHEMISTRY
Executive and General Sales Offices
161 East 42nd Street, New York 17, N.Y.

New Equipment

(Continued from page 184)



Davis-Standard Take-Up

Separate dual-motor drive permits the empty reel to be running at exact wire speed during cut-over, and a light-inertia guide sheave absorbs wire shock during cut-over. Constant wire tension is adjustable from two to 10 pounds pneumatically, and traverse is infinitely adjustable for wire lay and width of traverse.

Two five-hp. eddy current clutch motors with automatic breaking are a basic part of the take-up. Their speed is controlled by the dancer position of the accumulator sheaves. The patented retractable wire guide allows a normal speed of traverse when switching from full reel to empty reel and, in addition, permits both ends of the wire to be accessible on the loaded reel.

All rotating parts of the Model DR-24HS take-up are mounted on ball bearings, and reels are clamped on both sides while running to eliminate end play. Heavy guarding to protect the operator automatically lifts out of the way when a reel is lowered.

Patented wire snaggers are available to provide an adequate, easily accessible length of the inside end of the wire when desired.

Also available is an automatic measuring machine for signaling and/or totalizing of wire footage.

Ohmart Model SG Density Gage

The Ohmart Model SG density gage measures and controls fluid density, specific gravity, or % solids in a liquid continuously, accurately, and automatically, it is claimed. For use on bare or insulated pipes four to 14 inches in diameter, the Model SG gages are available from The Ohmart Corp., Cincinnati, O. They are available in a number of standard options to meet range, precision, and other requirements. Full-scale ranges are as narrow as 0.05 specific gravity units, with a precision as narrow as ±0.001 sgu. The gage clamps directly to the outside of the process pipe at the point of measurement; most installations are made without process shutdown.

In operation, the gage provides a control signal which can be fed to any standard potentiometric recorder/controller. Principle of operation is as follows. The gage is clamped to the pipe at a chosen location. Gamma radiation from a cesium-137 source passes through the pipe and the material flowing inside. The amount of energy absorbed by the material is proportional

(Continued on page 210)

Loading a bale of light-colored synthetic rubber into a Flotainer® package at the Torrance, California, plant of Shell Chemical Corporation

6

1

Light-Colored S-1006 is a hot, non-discoloring, non-staining, color-stable polymer which finds extensive use in light-colored, molded or extruded goods and applications where extreme whiteness and good aging resistance are demanded. The finished product reflects the whiteness of the bale.

2

Light-Colored S-1011 is a unique gel-free polymer that is used in adhesives and sealants. It is a hot rubber and is non-staining and non-discoloring . . . just the answer for white adhesive applications such as medical tape, and for various sealants which require outstanding color properties.

3

Light-Colored S-1502 is a non-discoloring and non-staining general-purpose rubber. Its exceptional balance of physical properties makes it one of the most popular COLD polymers. S-1502 offers you high strength and long wear as well as excellent original color and color stability.

good ways to whiter, brighter rubber products

For rubber products that are *whiter* than ever before . . . for colors that are *brighter* than ever before . . . Shell brings you six Cariflex rubber S-Polymers that are lighter in color than you ever thought possible.

If you make tennis shoes or whitewall tires; bathing caps or floor tiles; crepe soles or wringer rolls . . . one of the six light-colored S-Polymers below can improve product color and reduce costs.

With clear, color-stable Cariflex S-Polymers, you'll need less whitener to mask unwanted dark tones, and lower levels of other pigments to obtain a wide spectrum of brilliant colors.

Efficient methods for producing lighter colored S-Polymers were developed by Shell's extensive research program—one of the world's largest devoted to synthetic rubber. Other advances include: improved shipping containers such as the Flotainer® package and, most recently—first with the production of Isoprene Rubber in limited tonnage quantities.

Throughout the world, Shell research leads to results which benefit the manufacturer of rubber goods.

YOU CAN BE SURE OF SHELL

SHELL

Cariflex SHELL-MADE RUBBER

Trade Mark

FOR FURTHER INFORMATION, APPLY TO YOUR SHELL COMPANY

4

Light-Colored S-1509 is the new low Mooney version of S-1502. S-1509 eliminates breakdown, saving processing time and the cost of peptizing agents. This rubber is ready for immediate use in chemically blown sponge and other applications that demand easy processing and good mold flow.

5

Light-Colored SP-103 is a blend of equal parts of high styrene resin and low Mooney S-1509 rubber in easy-to-handle crumb form. The resin in this masterbatch is already dispersed to save you mixing time and reduce tendency to scorch. The inclusion of S-1509 makes this blend ideally suited for blown sponge.

6

Light-Colored Oil-Extended S-1703 and S-1707 are non-discoloring and non-staining, unusually light in appearance. S-1703 contains 25 parts of light-colored oil in 100 parts of polymer; S-1707 contains 37.5 parts of oil for even greater economy. Both polymers offer cold-rubber properties at low cost.

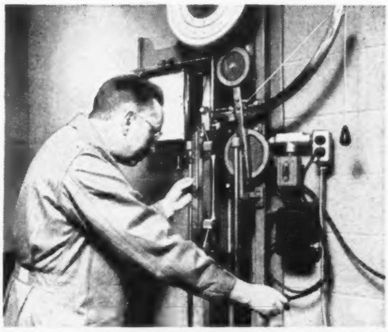
LD

severe conditions of ozone and stress call for extra-special protection . . .

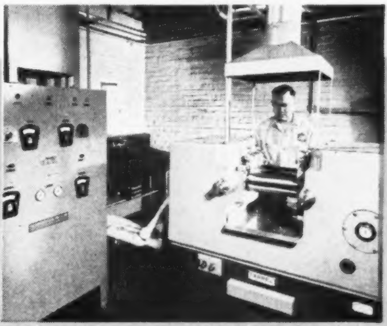
Smog which may contain up to 100 pphm ozone is hard on health and disposition. It is equally hard on rubber products. High ozone levels cause severe cracking in rubber formulations. In addition, stress also contributes to this problem as shown in Chart A, below left. How do you prevent such deterioration, assure long service life for your product under severest service conditions?

First, use antiozonants UOP 88 or 288, which offer maximum ozone protection. A relatively small loading of these low-cost antiozonants goes a long way in providing increased protection. Chart "B", for example, shows that 2 phr of antiozonant provides ample protection at an ozone concentration of 40 pphm, while an increase from 2 to 3 phr more than compensates for a 200% increase in ozone concentration.

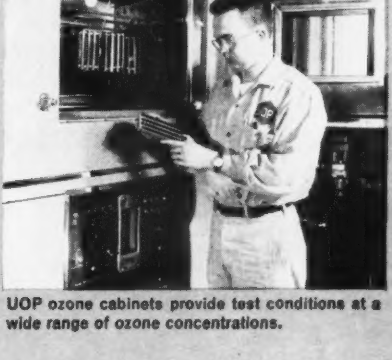
Ozone concentration is but one of many factors to consider in manufacturing antiozonant-containing rubber products. Our staff of specialists, backed by UOP laboratory facilities and field experience, will be happy to discuss your problems with you. Simply write or telephone our Products Department.



Every day we test a number of rubber recipes. The Scott Tester is used to measure physical properties of an experimental vulcanizate.



To evaluate any service problem, test formulations are carefully compounded in this rubber mill by trained UOP technicians.



UOP ozone cabinets provide test conditions at a wide range of ozone concentrations.

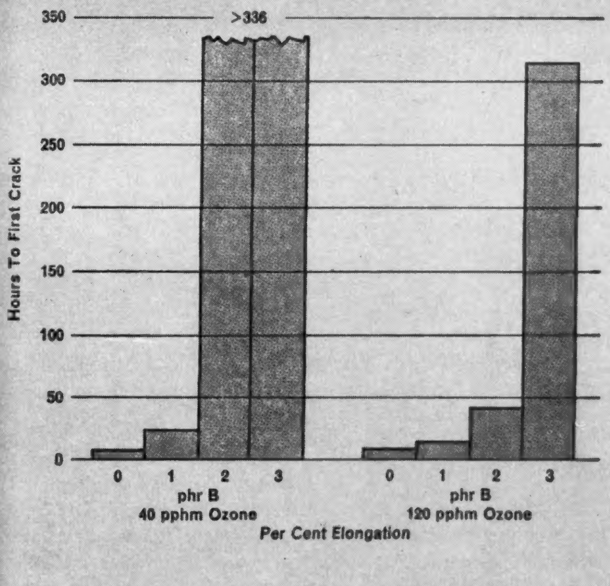
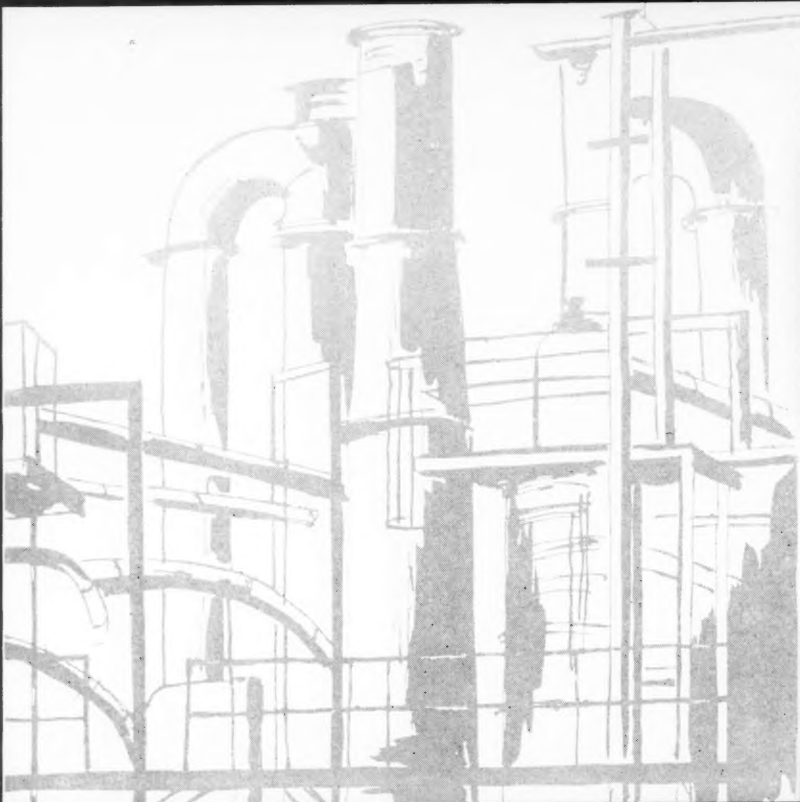
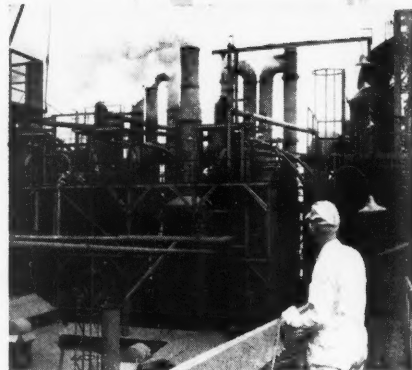


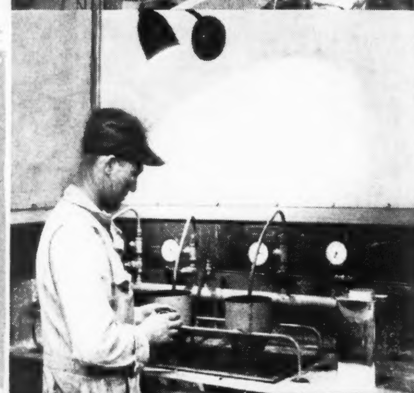
CHART B—Results of tests of two sets of samples containing varying amounts of antiozonants. Each were subjected to ozone concentrations of 40 pphm and 120 pphm. Note that an increase of 2 to 3 phr antiozonant proved adequate for the greatly increased ozone level.

UOP UNIVERSAL OIL PRODUCTS COMPANY

30 Algonquin Road, Des Plaines, Illinois, U.S.A.



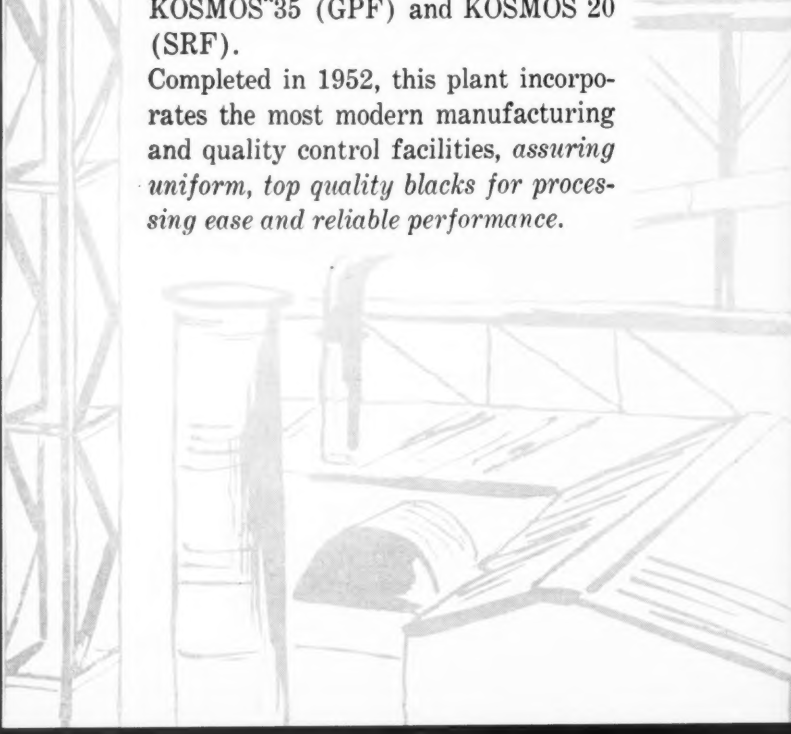


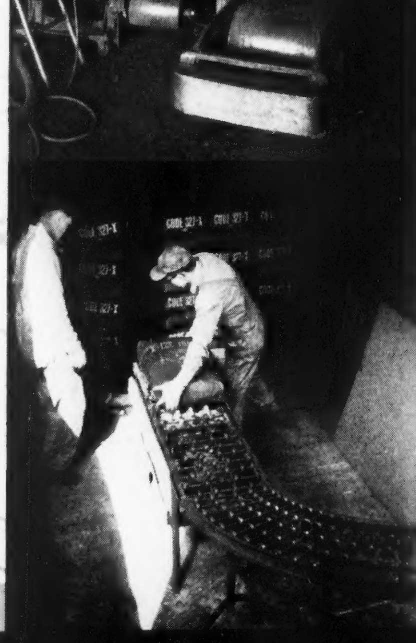


FROM UNITED'S NORRICK PLANT K

In Wheeler County, Texas, near the pleasant town of Shamrock, United's Norrick Plant produces a variety of carbon blacks, including the widely used KOSMOS*35 (GPF) and KOSMOS 20 (SRF).

Completed in 1952, this plant incorporates the most modern manufacturing and quality control facilities, *assuring uniform, top quality blacks for processing ease and reliable performance.*





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Floor Level
Diaphragm Shaping
for
GIANT TIRES
McNEIL
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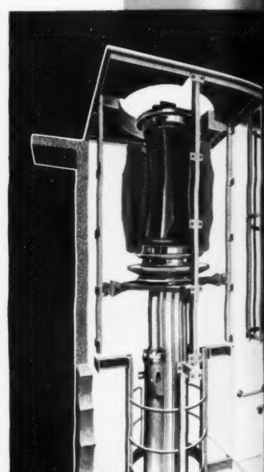
Fig. 1.



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Floor Level Assembly

GIANT TIRES

Bag-O-Matic® Shaping Unit

1. Designed and built to serve a highly specialized need — the application of the "Bag-O-Matic"® principle to the shaping, bagging, curing, and de-bagging of large "off-the-road" tires.

2. Shaping Unit Capacity — Tires from 24″ through 45″ rim diameter, sections up to 44.5″
   87″ Piston Stroke
   240,000 lbs. Maximum Pull-Down Force

3. The cylinder operated elevator feature provides easy access for lowering the green tire onto the elongated bladder. This allows floor level assembly and locking of the top bead ring and pressure dome.

4. The ring design is similar to proven Bag-O-Matic® design. The same clamping rings are used on all sizes of a given bead diameter changing only the bead rings when a different bead width is desired.

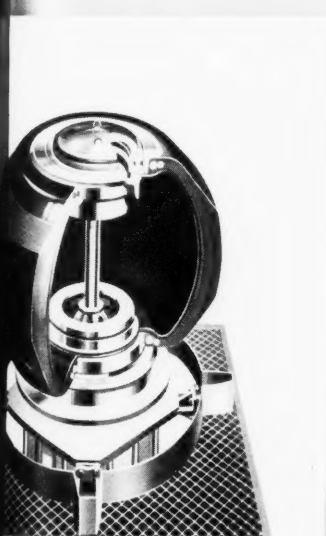


Fig. 3.

5. OPERATION

A. Uncured tire is lowered into pit over extended bladder. (Fig. 1)

B. Upper bead ring and pressure dome are then locked into position. (Fig. 2)

C. Elevator is then raised to floor level and the tire is completely shaped. (Fig. 3)

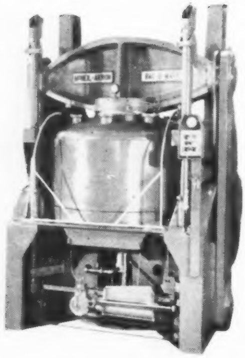
D. Pressure Dome is then removed from top of the unit and the rings are locked together in the curing position.

E. Shaped tire, bladder and ring assembly is then lifted off shaping unit and placed in tire mold for curing.

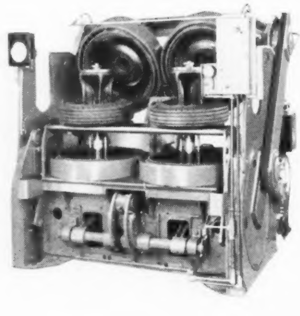
F. After curing, tire, bladder and ring assembly is removed from mold and placed on shaping unit. Clamp rings are then unlocked and piston rod is extended, stripping the bladder from the cured tire. Shaping unit is then lowered into pit, leaving cured tire at floor level.

Only McNeil makes a practical Profit-Producing Press for every type of Tir[e] and Mechanical Goods Production

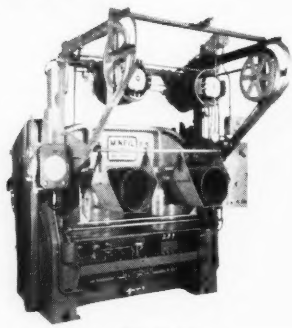
TIRE PRESSES



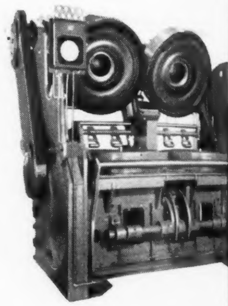
Model 900-75-25D
BAG-O-MATIC® Tilt-Back



Model 450-55-14D-M-4
BAG-O-MATIC® Tilt-Back
Also available with automatic features

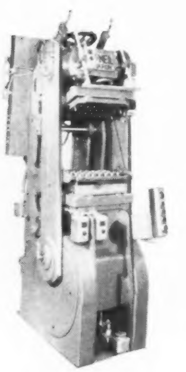


Model 230-40-11½
Twin BAG-O-MATIC®
with automatic — loading-unloading and post-cure inflation.

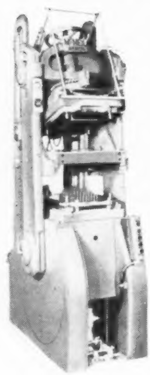


Model 825-55-14D-M-5
BAG-O-MATIC®

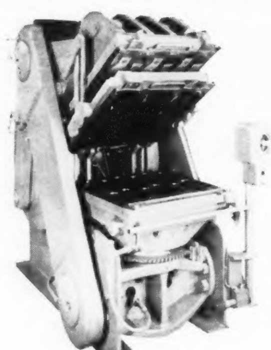
MECHANICAL GOODS PRESSES



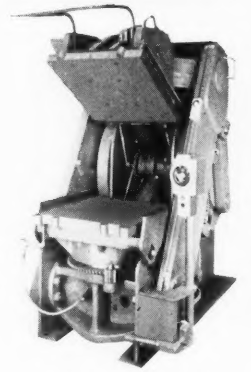
Model 150
Transfer Molding Press



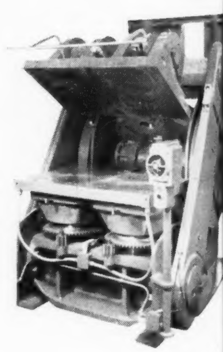
Model 300
Transfer Molding Press



Model 800-32
Intermediate Platen



Model 800-32
With Ejector



Model 800-24x48-7
Electrically Heated Platen

THE NAME TO REMEMBER FOR PRECISION

McNEIL AKRON

Manufacturers of the World's Finest Rubber Curing Equipment

MANUFACTURING AGENTS: Francis Shaw & Company, Ltd., Manchester, England; Vickers-Ruwolt Proprietary, Ltd., Victoria, Australia; Luigi Pomini, Soc. in Acc. di Luigi e Carlo POMINI fu Egidio e C. Castellanza, Province of Verese, Italy; Etablissements Repiquet, Bobigny (Seine), France; Harburger Eisen Und Bronze-Werke A. G., Hamburg-Harburg, Germany; Kobe Steel Works, Ltd., Kobe, Japan, A B Abjorn Anderson, Svedela, Sweden.

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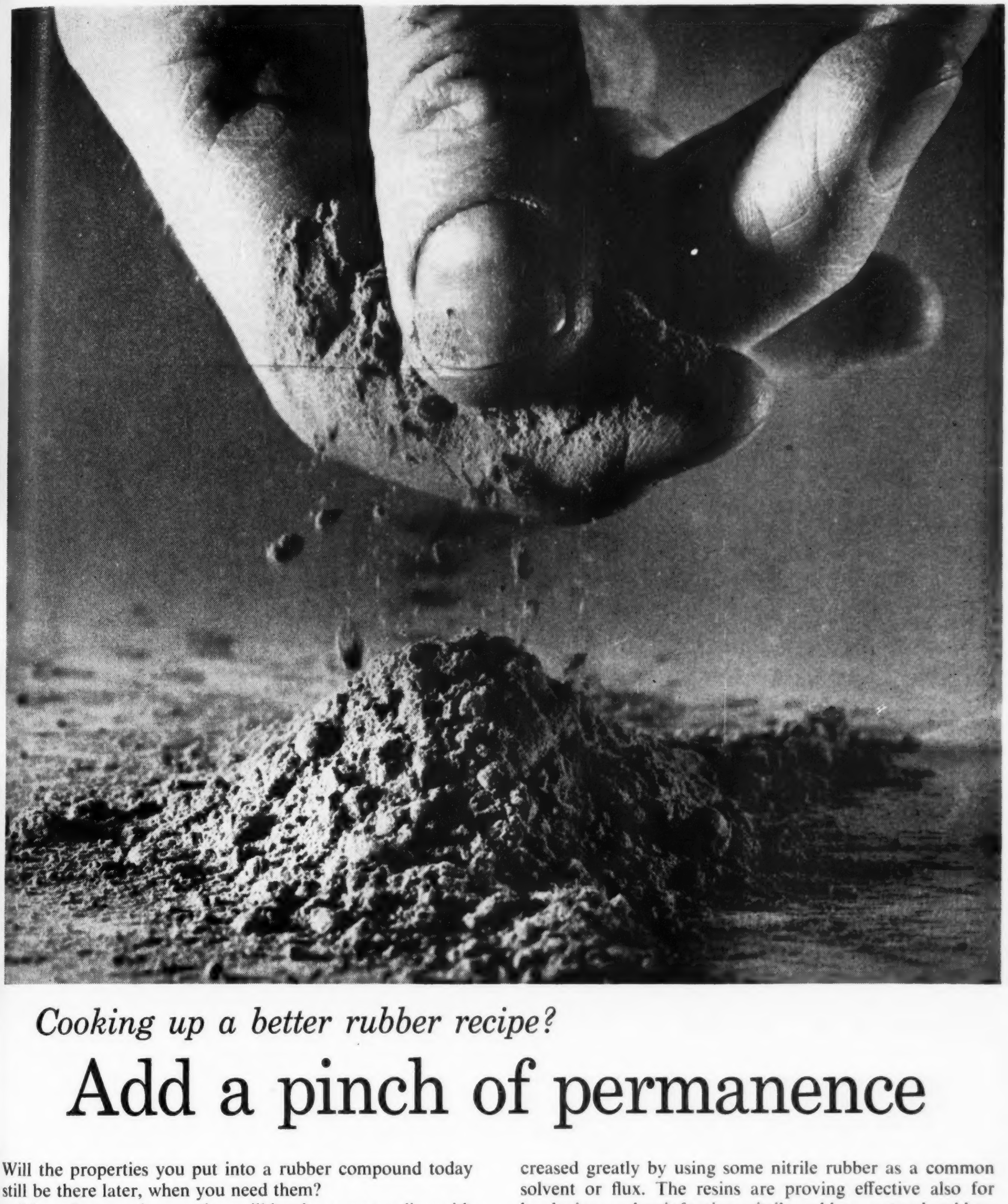

NEW MATERIALS

New "Viton" B Elastomer

A new "Viton" fluoroelastomer, designated "Viton" B, which offers significant improvement in performance at extremely high-temperature conditions and in contact with concentrated chemicals, has been announced by the elastomer chemicals department, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. This new rubber broadens the service area for the versatile fluoroelastomers both in mechanical goods and in coated fabrics.

Heat aging tests at temperatures in the range of 500 to 600° F. show that properly compounded vulcanizates of "Viton" B retain more elongation and show less change in hardness and weight than similar samples made with previously available types. Tensile strength retention is essentially equivalent. Embrittlement at elevated temperatures occurs much more slowly, and useful elasticity is prolonged to the point that service life is twice as long in many applications, according to Du Pont.

In the raw property state "Viton" B is very similar to "Viton" A. Some typical physical properties of the raw polymer follow:

Specific gravity	1.86
Mooney viscosity, ML-4/212° F.	115
Appearance	white, translucent
Solubility	low molecular weight ketones

Vulcanizates of the new type exhibit the high resistance to oil and solvents characteristic of "Viton" fluoroelastomers, with superior performance exhibited in contact with diester lubricants such as specified in MIL-L-7808, phosphate ester hydraulic fluid, tricresyl phosphate, and benzene.

"Viton" B has exceptional chemical resistance, with superiority demonstrated especially after exposure to sodium hydroxide and nitric acid at 158° F., as well as to red fuming nitric acid and glacial acetic acid at room temperature.

Although somewhat tougher in the raw state than "Viton" A, "Viton" B can be processed quite satisfactorily. Large factory batches have been successfully mill mixed, extruded, and calendered. "Viton" B synthetic rubber forms a very smooth band on a cool mill and, like "Viton" A, does not break down on mixing. Smooth extrusions are produced in a cool extruder from formulations of "Viton" B containing LD-214, a recently introduced curing agent.

The same compounding principles developed for "Viton" A are applicable to "Viton" B. A typical formulation contains a metallic oxide, a filler, and a curing agent. A small amount of plasticizer is used in some cases to aid processing. A higher amount of curing agent is necessary in order to obtain the best properties, particularly in compression set resistance.

Silastic 52 and 82 Silicone Rubbers

Two new general-purpose silicone rubbers have recently been introduced by Dow Corning Corp., Midland, Mich. Silastic 52 is a general-purpose, 50-durometer stock; Silastic 82 is a general-purpose, 80-durometer silicone stock. Both are formulated to give ease of processing and maximum heat stability. These two new stocks release from mill rolls without the use of scraper blades and feed into extruders easily. High green strength aids in the production of unsupported sheets without ripping or tearing. Maximum heat stability is evidenced by retention of flexibility after several days' exposure at 600° F.

New Materials

Silastic 52 and Silastic 82 are designed for many types of applications, including gaskets, seals, diaphragms and tubing for the aircraft, automotive, and appliance industries. Inventory of only these two stocks and then blending them allow fabricator and end-user a wide latitude in manufacture and selection of finished parts.

Some typical physical properties of the two silicone rubbers are reported as follows:

	Silastic 52	Silastic 82
Color	tan	tan
Specific gravity	1.15 ± .03	1.24 ± .02
Durometer hardness, Shore A	45 to 55	75 to 85
Tensile strength, psi	800 to 900	600 to 850
Elongation, %	230 to 270	150 to 200
Tear strength, lbs./in.	60	85
Brittle point, °F.	−100	−100
Water absorption, 70 hr. @ 212° F., % weight change	1.3	0.8
Electric strength, volts per mil	500	500

More detailed information on these two new Silastic silicone rubbers is outlined in Silastic Facts data sheets, 9-392 and 9-393, which are available from the company.

Density Gage

(*Continued from page 188*)

to the density of the material. Radiation not absorbed is detected by a unique, patented Ohmart cell, which changes radioactive energy directly into electrical energy.

During processing, as the material in the pipe becomes more or less dense than optimum, the amplifier output (a function of density change) can be applied through recorder/controllers to actuate valves, pumps, agitators, or other equipment. This closed loop is the Ohmart system for controlling the density variable in flow processing.

Multi-Purpose Recorder

A new multi-purpose recorder, designated the Fisher Recordall, costing only $1650, is made possible by the expanded production facilities at Fisher Scientific Co.'s new instrument manufacturing division at Indiana, Pa. The instrument features a new accessory for detecting, measuring, and recording slight temperature changes with extreme accuracy: the Thermistor Bridge.

The Fisher Recordall is a 5.5-mv strip-chart recorder with built-in circuits recording potential, direct current, resistance, and temperature directly. With the new Thermistor Bridge, the Recordall can measure temperatures to ±1° C. and record changes of ±0.005° C. or less, using a variety of interchangeable thermistor probes.

The new accessory takes advantage of the unusual properties of thermistors (semi-conductors which show a large change in resistance for a small change in temperature). The small size of thermistor bead enables it to respond to temperature changes much faster than thermocouples or resistance thermometers. Time constants of less than a second are obtainable.

Accessories record pH, polarographic current, pressure, vacuum, light intensity; plot cooling or melting curves, polarographic curves, a complete titration curve, a gas chromatogram; record readings of up to 10 instruments in rotation; and control outside circuits.

Fisher offers a wide variety of probes for measuring liquid, surface and air temperatures, and temperatures inside ovens, test rooms, pipe-lines and sealed vessels.

The Thermistor Bridge, in compact sheet-metal case, finished in gray hammertone enamel, comes complete with tubular probe, calibration charts, and operating instructions, for $100. Further details can be obtained from the manufacturer.

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A microscopic film of
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You won't be able to see it on the rubber but you will know of its presence because of the non-adhesive properties it imparts. Does not interfere with tack or knit of stock.
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NEW PRODUCTS

Porter PDG Tape

Quaker Rubber division, H. K. Porter Co., Inc., Philadelphia, Pa., is marketing a new type of electrical insulating tape which consists of a unique combination of polyester warp and fiber-glass yarn to which a silicone coating is calendered to one or both sides. The combination produces three characteristics which are notable improvements over existing tapes such as: 15% elongation, no abrasion between warp and filler threads, and excellent conformability. It also provides a reduced fabric cost which results in a lower price per roll of tape.

Called Porter PDG tape, its relatively high tensile and elongation enable an operator to apply it so that it snugly hugs the surface even on irregular contours. Also, unlike all-glass tapes, the absence of destructive friction between the polyester and the glass fibers under flexing and vibration prevents subsequent failure of the glass yarn.

Porter PDG tape is supplied in two constructions—the basic being the same in both cases—in any thickness from 0.010-inch and over. One method of construction is to calender balanced coatings on both sides. Further refinement of this process consists of a tape with a semi-cured silicone coating on one side and a green or unvulcanized coating on the other, suitably protected with a one-mil polyethylene sheet to prevent rubber transfer.

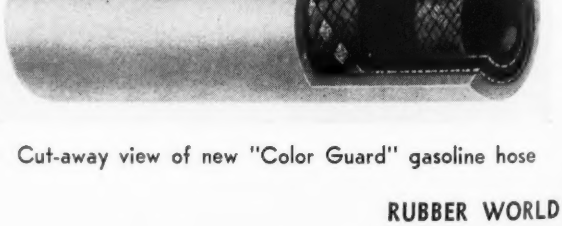
This new tape does not necessarily confine itself to be used in motor and generator coils, but also finds excellent application in the manufacture of diaphragms and ducting.

In general, procedures for insulating with Porter PDG tape are the same as those followed for Porter PR and PRG. Vulcanization can be carried out in a short time with moderate pressure in air circulating ovens, heated presses or bag molding in steam autoclaves at temperatures from 300 to 400° F. Curing after vulcanization is generally advisable. Total curing time depends upon the cross-sectional area of the insulation.

"Color Guard" Gasoline Hose

Acme-Hamilton Mfg. Co., Trenton, N. J., recently introduced its new colored gasoline pump hose, which is named "Color Guard" and is Underwriters approved.

Pioneered and developed after three years of extensive research by Acme-Hamilton, the new hose is the answer to consumer requests for a hose that would not mar the automobile finish. Field tests have shown the hose to have good service life and that "Color Guard" is resistant to deterioration caused by ozone-cracking, weathering and abrasion. Sturdy, flexible construction prevents damage if the hose is run over by cars or crushed at the curb. Major oil companies, after months of ex-

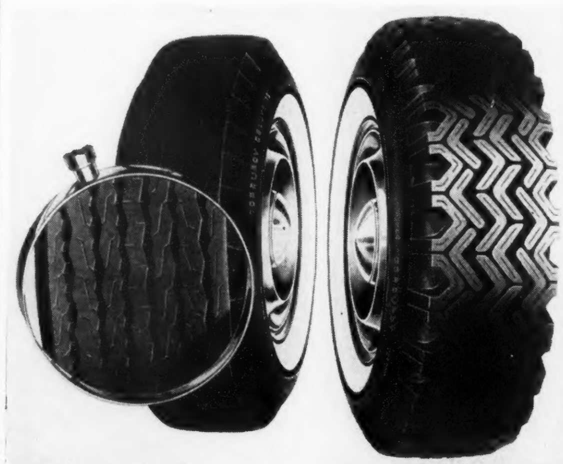


Cut-away view of new "Color Guard" gasoline hose

New Products

haustive laboratory and field tests, have approved the new hose for installation at their service stations.

The color permeates the entire cover of the hose. Hose cover colors are those approved by the major oil companies. The carcass is vertically braided, with a static wire included to dissipate static electricity. The tube, compounded of high-grade synthetic rubber for modern gasoline, is smooth for fast flow. The hose has an i.d. of ¾-inch, and o.d. of 1¼ inches, and a two-braid construction. The hose weighs approximately 50 pounds per 100 feet.



Deluxe "15" Tire . Triple Traction Tread Tire

Corduroy's "15" Tire

Corduroy Rubber Co., Grand Rapids, Mich., has added a 15-inch tire to its Deluxe line. It was formerly available only in 14-inch sizes, called the Deluxe "14." The addition of the Deluxe "15" means this new design will be available to owners of pre-1957 automobiles with 15-inch wheels. The Deluxe "15" is offered in both nylon and super rayon cord, in tube or tubeless construction, either black or white sidewalls.

The Deluxe line features a double reversed tread designed to increase traction on wet pavemnt or asphalt while retaining its smooth, quiet riding qualities for turnpike cruising. The Deluxe "15" is said to offer nearly three times the non-skid edges of ordinary tires. Each edge and angle of this reversed action traction tread have been designed to increase stopping power regardless of road conditions. In addition, high density, especially compounded rubber is claimed to give extra mileage and added safety.

An improved process of application of natural rubber on the tire cord gives greatest possible protection against ply separation, a particularly important advancement especially for tubeless tires, reports a company spokesman.

Triple Traction Tread

Corduroy has also developed a new tread design, designated the Triple Traction Tread, for its line of Triple Traction Tread tires. It is designed to provide more traction on wet pavement or in slush and deep snow as well as to reduce the highway noise level which has been a problem encountered with most snow tires.

In the new design corner cuts have been eliminated, and sipes inserted. This design change is said to give the Triple Traction Tread tire up to 25% more traction and to cut substantially both road hum and squealing on corners. This tire is available in all popular sizes, in both black and white sidewall, and in nylon or Cordco.

TOE TO HEEL... SY

SYNPOL synthetic rubber, made by TEXUS, fits all kinds of footwear needs—inside and out ...*indoors* and out. And it also fits many footwear manufacturing needs, such as the need to *keep costs down*. And the need for lighter, brighter footwear colors to blaze the way to 1960 market leadership. For this, TEXUS makes the lightest, whitest synthetic rubber grades to meet your requirements.

Most important, SYNPOL fits the vital need for *top quality*. Specifying uniform and rigidly tested SYNPOL is like taking out an insurance policy...that your footwear will stand up anywhere as highest quality merchandise! Send *now* for complete technical information.


Independent motorised two-speed nip adjustment—manual or automatic.
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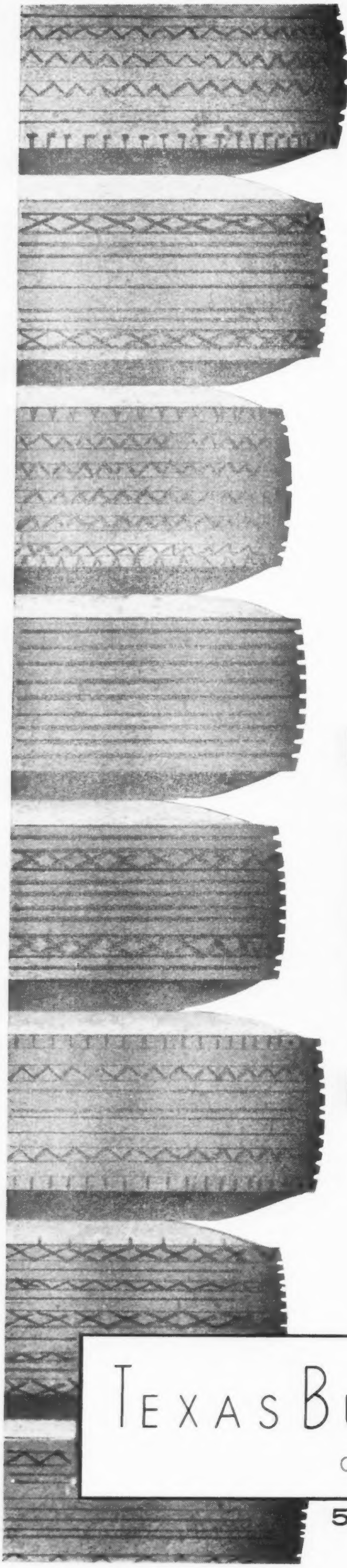

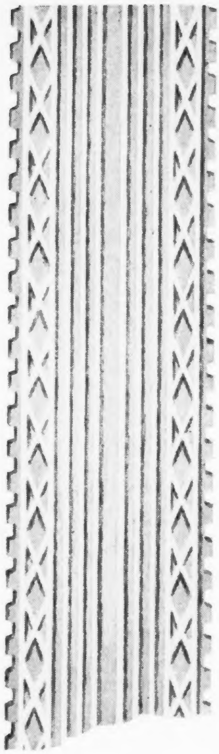

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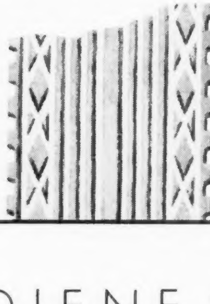

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Release With Real Ease

Sticky Products Won't Stick To Paper with a Syl-off Coating!

Unloading sticky gums, stocks and compounds from shipping containers, storage wrappings and interleaving is no fun when it's a tug of war—it's a costly chore. Manufacturers lose production time and lose money on material left sticking to the wrapper . . . and operators lose their temper.

Now you can be rid of this profit-eating problem. The solution is Syl-off* paper coatings developed by Dow Corning. These new silicone coatings resist sticking better than any other specialty coatings . . . stubborn stickers, such as unvulcanized rubber, latices and pressure-sensitive adhesive masses come clean quickly and easily.

Job Proved. Here's an example that's typical of the effectiveness of these Dow Corning coatings. A well-known company offers camelback on cores coated with Syl-off. Of all core treatments tested, only Syl-off gave completely satisfactory release . . . even after prolonged storage. Retreaders can easily remove *all* the camelback . . . none is left sticking to the core. Syl-off coatings are used with similar success on interleaving, multiwall bag liners, drums, boxboard and many other types of packaging.

How can Syl-off help you? If you ship sticky materials, Syl-off coatings assure your customers of stick-free, waste-free releases . . . provide an important sales advantage. If you receive, handle and process sticky products, you stand to save by specifying Syl-off coatings. You slash unloading time, shorten production time . . . and you throw away only the package — not a bit of the packaged product you've paid for.

In addition, you'll find Syl-off coatings have excellent water and moisture resistance; won't migrate, transfer or contaminate. They often last as long as the paper itself, and their light weight frequently means lower costs when shipping coated paper.

For more information about Syl-off paper coatings and a complete list of approved sources of paper and paperboard made with Syl-off coatings contact any Dow Corning branch office or write Dept. 9423.

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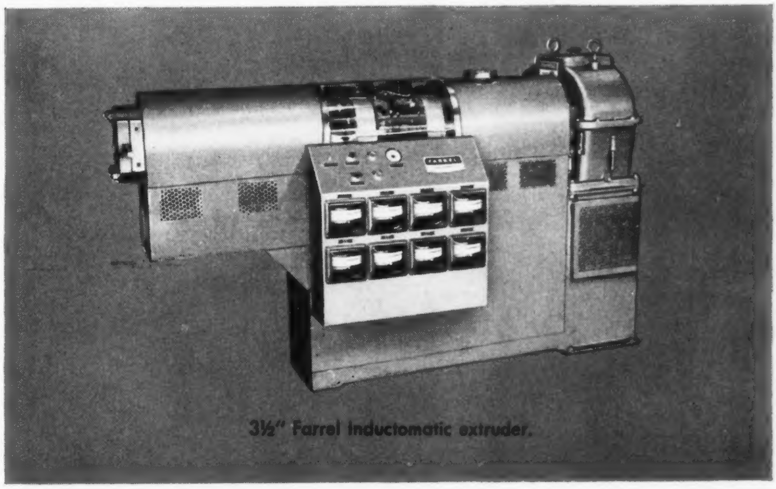
MIDLAND, MICHIGAN

ATLANTA BOSTON CHICAGO CLEVELAND DALLAS LOS ANGELES NEW YORK WASHINGTON, D. C.

The principle and advantages of induction heating as applied to Farrel Inductomatic extruders



3½" Farrel Inductomatic extruder.

Successful processing of plastic materials in an extruder depends largely upon the control of the material temperature within the various zones of the extrusion chamber.

With Farrel Inductomatics, heating is by the induction method, with separate primary coils for each of the required heating zones. The coils are wound around the extruder body with sufficient radial clearance to provide space for a cooling medium.

When 60-cycle alternating current is passed through these coils, it produces a magnetic flux with a path as shown in the diagram. The magnetic loop is closed by the laminated core segments, which are made from material with high permeability, thus providing minimum resistance to the magnetic flux.

The magnetic flux, which alternates with the same frequency as the primary current, induces a secondary voltage in the cylinder wall. The secondary voltage produces a secondary current, which, in turn, generates the heat that raises the temperature of the plastic material as it is forced through the cylinder. This is similar to a short-circuited transformer with a single secondary coil. The extruder body functions as secondary coil and, at the same time, as part of the magnetic core.

HEAT CONTROL

In order to control the temperature of the wall satisfactorily, the heating system is augmented by a cooling system. Separate blowers, for each heating zone, force air between the primary coils and the outer surface of the cylinder.

A thermocouple, inserted in the wall in each section, acts as a feedback to indicate deviation from any set temperature level. Because of the quick response of induction heating, a simple on-off control is all that is necessary. The control automatically turns the heat off if the temperature rises above a previously determined level, and turns it on when the temperature drops below this level. The cooling system is controlled in the same manner.

ADVANTAGES

In comparison with extruders in which the heat is applied to the outside surface of the cylinder, Farrel Inductomatics offer a number of important advantages.

1. *Better temperature control.* Because the heat is generated closer to the plastic stream, there is less overshoot when approaching a temperature setting.
2. *More efficient cooling.* Air ducts are between the primary coils and the chamber wall.
3. *Faster heat-ups* are permissible because high thermal stresses are not introduced.
4. *Higher production rates* result from faster heat-ups, faster change-overs and less scrap.
5. *Lower maintenance.* Induction coils have unlimited life.
6. *Reduced labor cost.* Minimum operating attention is required.

FOR FURTHER INFORMATION

Send for a *free* copy of *new* bulletin 208, which describes Farrel Inductomatics in detail.

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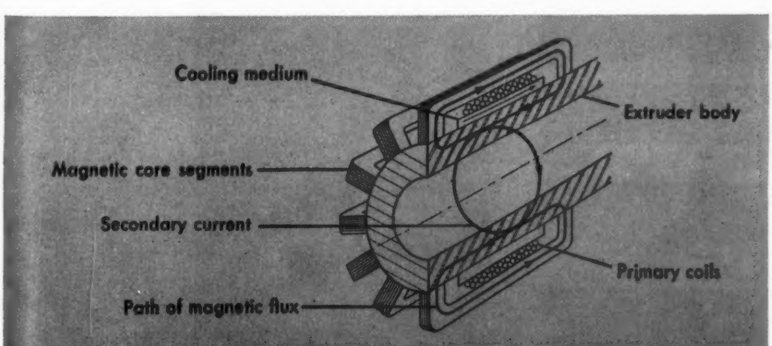


Diagram showing path of magnetic flux and secondary current.

FB-1182

Synthetic Rubber Not Static in 1958!

THE "Fourth Report of the Attorney General on Competition in the Synthetic Rubber Industry," released on September 28, includes among its conclusions that, "Overall, the industry presented a rather static picture, with no startling changes from 1957." Events during the period of 1958 and early 1959, as recorded in the Report itself as well as elsewhere, might be said to contradict this conclusion.

For example, 1958 being a year of both recession during the first half and then recovery in the second half, saw rather marked changes in synthetic production and consumption during the year. Although producers of general-purpose synthetic SBR averaged operation at only 62.6% of capacity, as compared with 66.2% in 1957, operation during the last quarter of 1958 jumped to 72%. Consumption of synthetic rubber of all types as percentage of total new rubber continued its rise from 63% in 1957 to 64.5% in 1958, with a further rise to more than 65% in 1959.

Aside from prices held down by the continuing buyers' market, competition was intense in providing improved quality, packaging, and technical service to consumers. The increase in the number of new grades, particularly of SBR, had the effect of price reduction since most of them were oil or oil-black masterbatches selling at prices below those of the straight polymer types, while at the same time providing economies in compounding and handling.

Although unpigmented cold SBR continued to dominate the production of this-type synthetic at 40.4% of total SBR in 1958, the output of cold oil masterbatch at 31% gave evidence of overtaking the former in comparative production position. Production of cold oil-black masterbatch increased from 2.2% in 1957 to 5.6% in 1958 because of new black dispersion methods, and six more producers entered this field.

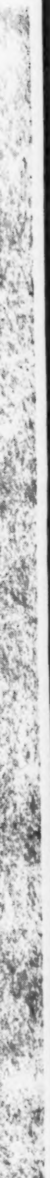
A number of companies continued their development of synthetic polyisoprene and polybutadiene, and plans for commercial production of both of these more complete replacements for natural rubber will be realized more fully in 1960. These rubbers will not only contribute to national security, but should have a stabilizing effect on natural rubber prices.

Another noteworthy and important development was the growth of synthetic rubber production capacity abroad which may amount to almost 400,000 long tons in 1960. American producers will have increasing difficulty in maintaining their export volume under such conditions.

All in all, the picture of the synthetic rubber industry as "static" in 1958 and early 1959 seems somewhat unreasonable. Production and consumption varied over a wide range; consumption of synthetic continued to climb; the pattern of SBR production by types showed significant changes; the export market presented a new picture; and new synthetic competitors for natural rubber indicated that they were about to become available in commercial quantities.

With the boom of the 1960's just ahead, synthetic rubber will most certainly continue to be an increasingly dynamic industry.

R. G. Seaman
EDITOR



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RUBBER WORLD

Tire Reinforcing Materials Other Than Rayon or Nylon[1]

By C. A. LITZLER
C. A. Litzler Co., Cleveland, O.

IN THE continuing search for improved tire carcass reinforcing materials, the fiber producers are developing completely new cord materials or are improving the performance characteristics of the older fibers. These developments have resulted in a considerable increase in tire cord and cord fabric dependability which further results in greater tire mileage, increased tire safety, and generally improved tire performance. This paper contains a report mostly on some of the newer tire cord materials, other than nylon and rayon, which are being used or give promise of becoming good tire cord materials.

These major fiber developments are occurring principally in the United States, England, Germany, Italy, and Japan. These countries have the greatest number of vehicles, including farm vehicles and aircraft, and have been the areas of very rapid growth in the number of vehicles of all types since the World War II period. These areas have all had a remarkable increase in number of vehicles related to population in this period. (See Table 1.)

This increase in the number of vehicles and the resultant boost in tire production have created a very large demand for heavy denier construction textile reinforcements. In fact, tire manufacturing represents the second largest market for synthetic filaments, yarns, and cords, exceeded only by strictly apparel uses.

Along with the increase in numbers of vehicles, serv-

[1]Presented before the Rubber & Plastics Division, ASME, St. Louis, Mo., June 15, 1959.

The Author

C. A. Litzler, president, C. A. Litzler Co., Inc., was educated at St. Ignatius High School and John Carroll University.

Mr. Litzler started his engineering career with the Iron Fireman Mfg. Corp. as assistant mechanical superintendent. In 1935 he was elected vice president in charge of engineering of Morrison Engineering Co. He joined the Industrial Oven division of Metal Equipment Co. as chief engineer in 1939 and was elected president of that company in 1942. He founded his own company in 1952.

Since 1942, Mr. Litzler has made 15 trips to major industrial areas of the world visiting tire, fiber, and plastics producers.

He is a member of The American Society of Mechanical Engineers, the Wire Association, the Society of the Plastics Industry, and the Cleveland Engineering Society and has held various offices in these societies.

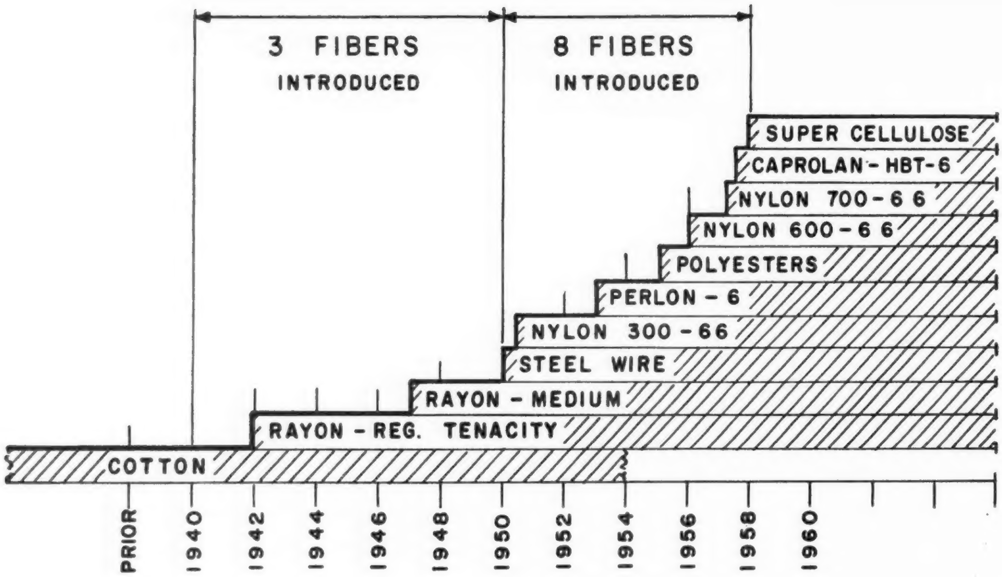

Fig. 1. Approximate dates of introduction of various tire cord fibers in the U.S.A.

TABLE 1. POPULATION TO VEHICLE RATIOS FOR SELECTED AREAS

(—000 Omitted)

Area		1948	1950	1952	1954	1956	1958	Estimate 1960
U.S.A.	Population	150,000	155,000	158,000	162,000	165,000	169,000	175,000
	No. of vehicles	34,000	41,000	46,500	55,000	62,000	66,600	72,000
	Ratio, pop/veh	4.41	3.8	3.4	2.95	2.7	2.54	2.42
Greater Europe	Population	525,000	535,000	542,000	553,000	565,000	580,000	587,000
	No. of vehicles	7,000	8,900	12,500	15,034	19,700	24,350	28,000
	Ratio, pop/veh	73.5	60.1	43.4	36.8	28.7	23.0	21.0
Canada	Population	11,000	12,000	13,000	14,200	15,300	16,000	17,000
	No. of vehicles	1,150	1,600	2,200	3,000	3,700	4,400	6,000
	Ratio, pop/veh	9.6	7.5	5.9	4.75	4.2	3.65	2.85
Japan and Asia	Population	83,000	85,000	87,000	90,000	92,000	98,000	105,000
	No. of vehicles	487	950	1,500	1,840	2,260	2,840	3,800
	Ratio, pop/veh	170.1	85.0	58.1	49.0	41.0	34.6	27.6

Basis—U. S. Bureau of Census, Rand McNally Corp., and McGraw Hill Publishing Corp.

ice conditions for tires have become more severe. Road speeds have increased; weights of vehicles have increased; long-distance travel has increased, all imposing more severe conditions on the tires. This development has given impetus to both tire manufacturer and textile producer to improve their products to withstand these conditions while generally improving the safety performance limits of the tire itself.

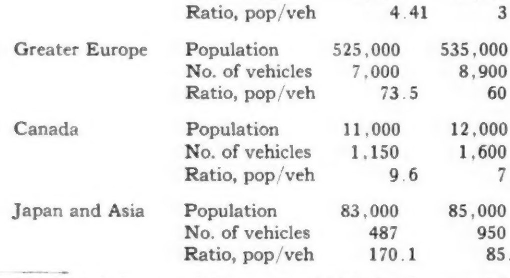

Fig. 2. Increase in tenacity of tire cords, 1940-1958

Total tire production throughout the world is constantly increasing, and with this mushrooming of tire production there has been a corresponding increase in the number, size, and distribution of synthetic fiber plants to serve these tire facilities. Fiber supply is keeping well apace of tire cord needs both in quantity and in ranges of tenacity for the tire cords and fabrics that the rubber industry requires.

The materials which will be covered in this report

Tire Cord Developments

A number of materials have shown promise of being potential tire cord fibers other than the currently popular rayon and nylon fibers. Some of these materials have been used in experimental trials and are closer to possible commercial use than others, but all of the materials considered in this paper have properties that make them reasonable candidates for tire cord use.

Some of the most promising are discussed in detail and include (1) the Perlon, or nylon 6 group; (2) the improved caprolactam-based fiber, "Caprolan"; (3) the polyester group, "Dacron," "Terylene," "Diolen," and "Tetoron"; (4) wire cord; (5) the polyurethane group; and (6) glass fibers. Also covered in less detail are some materials such as polypropylene and a fiber which is a combination of urea and amide polymers. Tires filled with urethane foam are included in the discussion since, according to the author, they may well affect the cord market if current development work should lead to the commercial production of such tires.

In conclusion, it is suggested that the current market is primarily interested in cellulosics and nylon, with wire cord being used in significant amounts. The cellulosic fibers have been making a serious comeback with the development of improved types. The new fibers being tested must make a bid for this tire cord market on the basis of cost and ability to aid the tire manufacturer to increase further tire mileage and safety in the face of increasing demands on tire performance.

include the following classifications with the country or area in which they were principally developed: (1) the Perlon group from Germany; (2) the improved caprolactam-based fiber, "Caprolan," in the United States; (3) the polyester group being developed in England, Canada, the United States, and Germany; (4) the wire tire cord in the United States, France, and Italy; (5) the polyurethane group in Europe; (6) the glass fibers in the United States and Japan; (7) other textile fibers which hold promise in all areas, and (8) the non-cord tire developments of both the United States and Europe.

Fiber Developments—General

A review of the fiber industry accomplishments shows a considerable advance in the number of types of fibers suitable for fiber-rubber systems which have already been put into production. In the past 20 years there have been 11 types of fiber figuring in tire use. Eight of these have been introduced in the last 10 years. This rate of development reflects the degree of effort being exerted by textile companies to improve the fibers available to the rubber industry. (See Figure 1.)

This concentrated research has resulted in rapid forward strides in the tenacity of textile fibers produced for tire use. In 18 years there has been an overall tenacity increase from 3.6 grams per denier to 7.5 grams per denier. (See Figure 2.) This increase in tire cord strength has contributed to the greater tire service life achieved during this period when average road speeds have approximately doubled. These improvements in tire performance, of course, could not have been made without the parallel advances in tire design, compounds, and manufacturing techniques and equipment which demonstrate how the fiber and tire manufacturing industries have kept pace with each other. The cooperation between the two industries has been remarkable, without which neither one would have succeeded nearly so well in upgrading tire performance.

The use pattern of rayon, as compared with nylon tire cords of all tenacities for the 1948-1958 period,

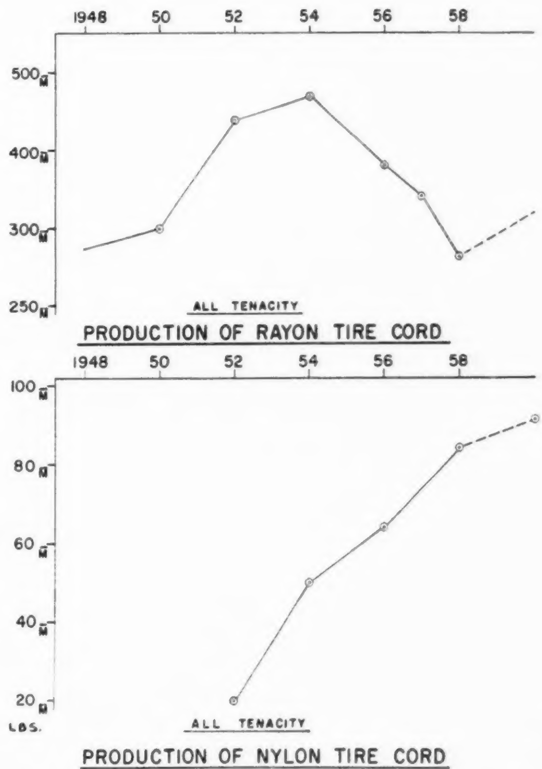

Fig. 3. Production of the major commercial tire cords, 1948-1958

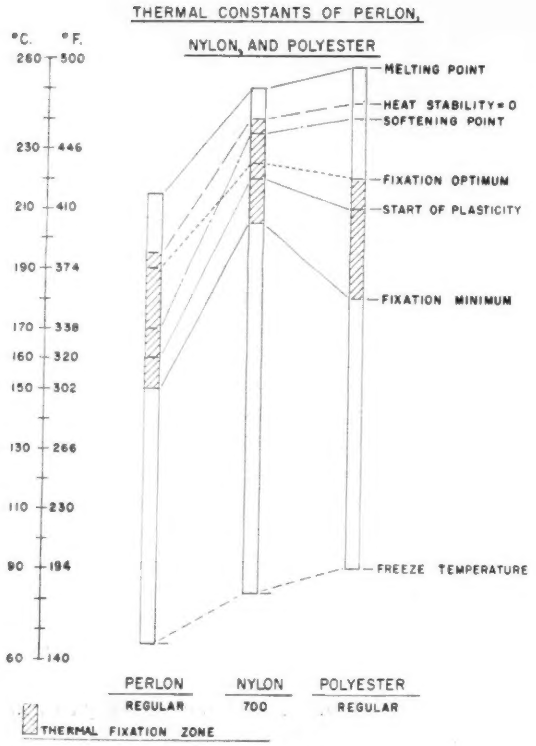

Fig. 4. Comparison of thermal constants of Perlon, nylon, and polyester cord fibers

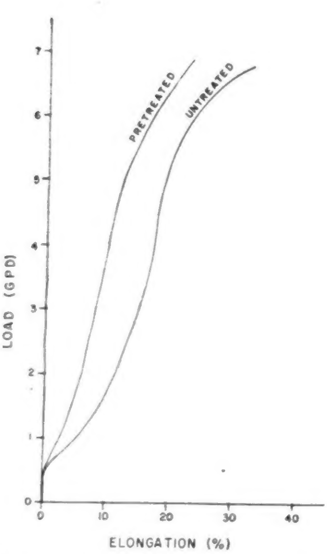

Fig. 5. Stress-strain curve for "Caprolan" HBT 840/2 denier in both treated and untreated state

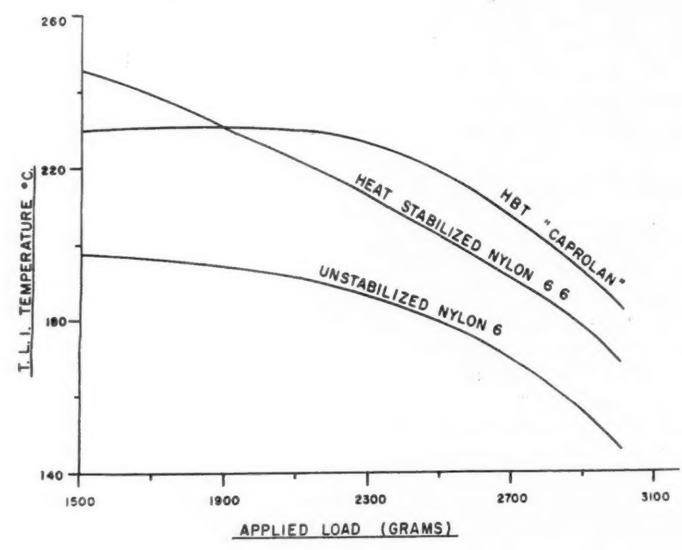

Fig. 6. Thermal failure under load of "Caprolan," nylon 6, and nylon 66-840 denier tire yarns

shows a steady gain for the latter at the expense of the former. In the recent past, developments in viscose tire cord have provided a tire material with improvements in tenacity and other important characteristics and the usage of this-type cord has increased considerably and has influenced the fiber consumption trend in the tire industry. Although discussion of rayon and nylon cords for tires is not the major aim of this paper, their use pattern during the past 10 years and an indication of future trends are shown in Figure 3.

The fiber and other tire reinforcing materials to be discussed are now being used, productively or experimentally; some of them are comparatively old, and several are new, but all of them are at least likely candidates for the tire cord market.

Perlon

Perlon[2] fiber was developed about 20 years ago in Germany, and for some time it was thought to be suitable for tire cord use. This material is a caprolactam-based fiber and is generally known as nylon 6; although it possesses excellent general characteristics and is much used as a textile material, it has been determined now that it is not particularly suited, in original form, for tire use.

Many attempts have been made to produce high-performance tires with Perlon fiber, but with only fair results. A concensus of opinion by most tire companies indicates that two main physical property problems limit its use in tires. These are, in general, low heat stability and a low level of thermal constants and a medium tenacity as compared to today's accepted levels.

The left and center bars of Figure 4 depict the melting points, the optimum fixation point, and other thermal constants of Perlon in comparison with those for Type 700 nylon (Du Pont) and for polyester fiber.

Production of the German Perlon material was begun in the United States in proper cord deniers for

[2]Farbenfabriken Bayer, A.G., Leverkusen, Germany.

tire use, but, as far as can be determined, it is little used in tires, a situation which will continue until further developments have increased both its melting point and its tenacity.

"Caprolan"

An improved caprolactam-based fiber known as "Caprolan"[3] is now in production and use in tire production in the United States. The polymer from which the fiber is made is based on epsilon aminocaproic acid and is said to have a molecular construction almost identical to that of nylon 66.

"Caprolan" differs from nylon 66 in a few basic respects. It has a lower melting point and somewhat lower retractive forces, but better tensile strength retention properties at elevated temperatures, when compared with nylon 66.

This improved caprolactam-based fiber is rated by its producer at a high level for fatigue value. Under typical Rotorflex test conditions, after up to 3.6 million cycles, this fiber has shown 2.0 to 2.5 times greater life than other fibers. Under tension vibration tests "Caprolan" run to failure showed a 10% improvement over the other fibers involved in the tests. Load-elongation characteristics were also found to be quite comparable to other fibers in both the greige cord and in the dipped and multiple-zone stretched and treated conditions.

These treating conditions are readily reproducible on existing commercial dipping and treating lines. Dipping tensions of ¼-pound per cord are commonly used for conventional rayon and nylon cords and are well within the range of most modern dipping systems. The drying tensions are in the approximate range of one pound per cord, which also is well within the tension capacties (and stretch capacities) of the same modern tire cord treating units.

Stretch ranges in the order of 14% indicate a produced cord tension (at the stretching temperature of 410° F). of approximately five pounds per cord. This range requires 15,000-pound maximum tension capacity in the heat set unit of a full-scale production machine. This tension capacity also is well within the range of most existing modern treating systems.

Normalizing or relaxation of the cord was accomplished at 1⅔ pound per cord with a residual shrinkage in that zone of 2½-3½%. Both the lower impressed tension and the resulting shrinkage in length are minimum requirements and again are readily obtainable in most commercial units.

Treating of this type of fiber cords or fabrics is now being accomplished on several existing multiple-zone fabric treaters or calender-line units.

In fact, several tire companies are at the present time using "Caprolan" cords on an equal specification basis with nylon 66 cord fabrics.

TABLE 2. TYPICAL CONDITIONS FOR "CAPROLAN" CORD TREATMENT IN COMPUTREATER LABORATORY UNIT. BREAKING STRENGTH IN 29-30-LB. RANGE. STANDARD RESORCINOL-FORMALDEHYDE LATEX DIP, 20% SOLIDS. HOT STRETCH SECTION OPERATED AT CONSTANT STRETCH, AND NORMALIZE SECTION OPERATED AT CONSTANT TENSION

	Time, (Sec.)	Temp., °F.	Tension, (Lbs.)	Stretch, %
Presaturation	—	room	0.165	0
Latex dip	—	room	0.254	0
Drying oven	160	280	0.992	0
Hot stretch	30	410	5.00	14
Normalizing	30	380	1.65	—
Cooling/winding	40	room	0.150	—

TABLE 3. AVERAGE PHYSICAL PROPERTIES OF HIGH-TENACITY, BRIGHT, HEAT STABILIZED (HBT) "CAPROLAN"

Properties	Industrial 840 Denier
Tenacity (gpd), std.	8.4
Wet	7.6
Std. loop	7.0
Knot	6.3
Tensile strength, psi.	122,000
Elongation at break, %, std.	18
Wet	22
Specific gravity	1.14
Moisture regain, at standard conditions, %	4.5
Water absorbency, at 95% R. H., %	7.8
Melting range, °C.	212–220

The stress-strain curve, Figure 5, gives data for 840/2 denier "Caprolan" cord both as received and after treatment in a triple-zone, five-end Computreater[4] laboratory unit. The results presented in Figure 5 were obtained with a IP-4 Scott inclined plane tester.[5]

The cord dip was the usual resorcinol-formaldehyde latex of 20% total solids. The dried deposition on the cord was about 5-6%. The cord was given a preliminary water dip and then the RFL dip. The machine conditions under which the cord was processed are presented in Table 2.

[3]Allied Chemical Corp., National Aniline Division, New York, N. Y.
[4]Rubber World, Feb. 1958, p. 701.
[5]SCOTT TESTERS, Inc., Providence, R. I.

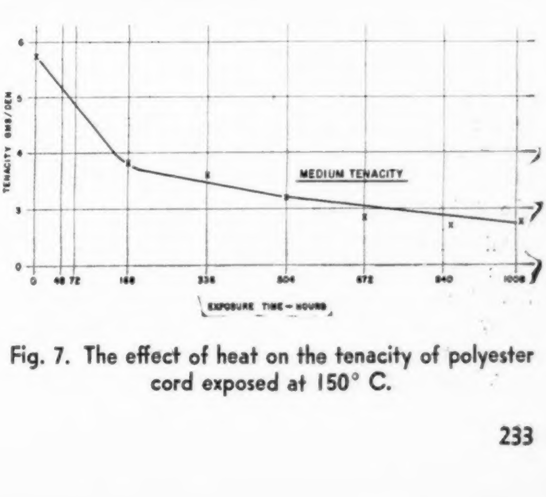

Fig. 7. The effect of heat on the tenacity of polyester cord exposed at 150° C.

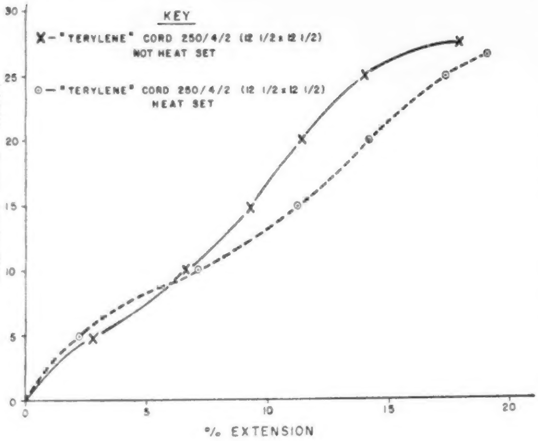

Fig. 8. Breaking load *versus* % extension curves for "Terylene" polyester tire cords

"Caprolan" has favorable high-temperature characteristics which contribute to this material's importance in the tire cord field, and its ability to retain tenacity at elevated temperature is comparatively high.

The Thermal Load Index curves in Figure 6 show the temperatures resulting in immediate failure of the fiber at any given load, in the range of 1.8 to 3.7 grams per denier. Note the greater load-bearing ability of HBT "Caprolan" at the higher temperatures. Nearly 20% more load is required to cause failure at 220° C., for example, than in heat stabilized nylon 66.

The general characteristics of "Caprolan" are shown in Table 3. Although these characterisitcs are not related specifically to tire cord use, they help supplement other information presented to give an overall picture of the material.

The Polyester Group

Another fiber family which has advanced experimentally, at this time, for tire cord use is the polyester group. This-type fiber is known domestically as "Dacron,"[6] abroad as "Terylene,"[7] "Diolen,"[8] and "Tetoron."[9] The differently named materials are all basically polyethylene terephthalate and are the product of terephthalic acid dimethyl ester and glycol. This type of fiber originated in England approximately 10 years ago.

The polyester filaments have a uniform round cross-section and are basically soft and supple and have a reasonably high grams/denier strength, as well as excellent strain-load characteristics and excellent high-temperature stability.

The Adhesion Problem

All other technical considerations considered, the basic problem encountered in polyester rubber systems has been the adhesion of the cord to the elastomer. Many experimental tires have been built from polyester and quite successfully run. All of these test tires, however, have been built from fabric which has been hot stretched and treated with xylol/isocyanate adhesives. Some work has been done in Europe utilizing triisocyanates and methylethyl ketone solvent vehicles.

The use of solvent dips is not a practical solution to the polyester adhesive problem as very few treating machines are available for solvent dips since the industry, almost universally, now uses aqueous solutions of RFL with or without vinyl pyridine as adhesives.

E. I. du Pont de Nemours & Co., Inc., about one year ago announced the development of an aqueous-based adhesive for "Dacron" polyester fibers and rubber systems. It was primarily introduced for use in V-belt cords, hose, and possibly "Dacron" rubber-coated fabrics. Some experimental tires have been built with this system, but, as yet, the adhesive using "Hylene"[10] is not recommended as being suitable for tire cord use.

Other adhesive systems are being worked on elsewhere which hold considerable promise to produce high-level polyester-rubber adhesives that will provide high fatigue resistance at high-temperature levels. These systems are being developed principally for tire cord fabric-to-rubber adhesion.

Laboratory and pilot-plant developments and test results of the polyester group of cord fabric types as yet are not entirely conclusive by any means. The work that has been concluded in the last five years, however, seems to hold much promise. Although the material is somewhat lower in tenacity than nylon and the new cellulosic fibers, it seems to combine the advantages of both and seems to eliminate the disadvantages of other fiber materials.

Strength Characteristics

In comparison to other fibers, the polyester group has tensile-elongation characteristics equivalent or superior to those of other more commonly used fibers.

In tire reinforcing use, the stability of the fiber at elevated temperatures is of primary importance. A study of the thermal stability of polyester cords at 150° C. as compared to exposure times is shown in Figure 7.

It is to be noted that the greatest degradation occurs during the first 168 hours. After that period the degradation of tenacity progresses less rapidly. In relation to other fibers, this performance indicates sufficient cord strength at elevated temperatures for periods of time greatly in excess of any normal tire requirement.

The treating ranges for polyester (tire) cords use has been well defined by a considerable amount of laboratory work. An example of strain-load curves of a polyester cord treated under usual conditions is shown in Figure 8.

The stretch characteristics at 5- and 10-pound load levels indicate these conditions (neglecting any other characteristic) as being suitable for tire cord use.

Thermal Constants — Polyesters

The start of plasticity of the filament, the softening

[6]E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.
[7]Imperial Chemical Industries, Ltd., London, England.
[8]Vereinigte Glanzstoff Fabriken, Wuppertal, West Germany.
[9]Teikoku Rayon, Ltd., Osaka, Japan.
[10]Water-blocked isocyanate, Du Pont.

point, the zero heat stability range are criteria for the judgment of the fiber suitability. A brief comparison of these properties of polyester fiber, Perlon, and nylon is shown in Figure 4.

Significantly, the tensile strength of the polyester fibers is relatively high, and elongation is comparatively low, and this condition, in addition to reasonably high-temperature stability together with a high fatigue level, makes this type of fiber excellent for tire use.

It has been reported from several sources that the use of polyesters has been fully approved and standardized upon by the USSR. Air Force for all aeronautical tire use. If this report is true, it underlines the increasing use of this material as has been predicted by many European tire and textile engineers and designer.

Figure 9 shows the variation in tenacity of polyester yarn at elevated temperatures. At the 120° C. tire temperature level the tenacity is approximately 4.6 grams per denier.

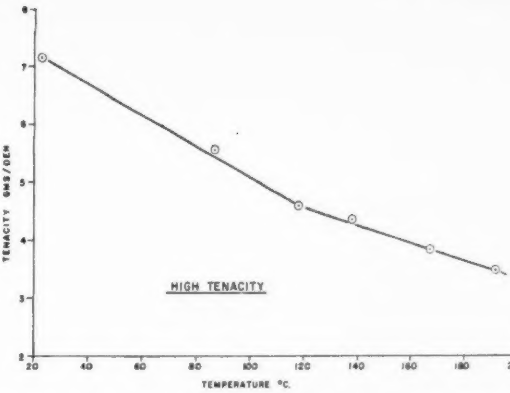

Fig. 9. Tenacity of polyester yarn at elevated temperatures

Wire Cord and Tires

The continuously increasing success of the wire cord in tire construction in Europe has stimulated interest in this type of tire in the U.S.A. and elsewhere. The principal use of wire cord tires is in truck and bus tires and, in some cases, for off-the-road tires. Mileage life in most cases (with relatively smooth road surfaces) is very high and in some reported cases is phenomenal.

The importance of this type of heavy-duty tire is demonstrated by the fact that the usage of high carbon tire wire in the U.S.A. is now at the 6,000,000-pound-per-year level. It is fully expected to reach a rate of 12,000,000 pounds yearly by 1972 or 1973.

Practically all major American producers are in production on wire cord tires, either under foreign technical license agreements or by independent work of their own. Continuous development work on new designs, cord constructions, rubber compounds, and manufacturing techniques is under way.

The wire cord tire, as such, differs not only in the obvious matter of cord material, but also in the construction of the carcass plies and in the method of the tire's manufacture. Conventional tire designs are used in some cases, but the characteristic of the wire material also allows, or rather necessitates, a radically different tire construction known as the "radial ply."

The cord wire itself usually consists of seven three-wire strands of which six are concentrically stranded around a middle triple-wire strand. Individual strands are triple strands of 0.0058-inch-diameter individual wires. The cable lay is a nominal 0.340-inch. All wires are usually brass plated. The tensile strength of the individual wires is in the range of 400,000 pounds per square inch. Cord diameters are about 0.035-inch plus or minus 0.001-inch including the brass plating.

Another wire construction commonly used is a wire strand composed of five strands of seven 0.0058-inch wire filaments; each five strands are laid concentrically around a three-wire central strand. The diameter of this cord is 0.048-inch including the brass plating.

Stress-strain in curves of both types of wire cord are shown in Figure 10. The curves indicate very high breaking strength and excellent elongation characteristics. Fatigue ratings of these two cord construction are very high, and tire life, even under heavy service loads, exceeds that of heavy-ply tires constructed of high-tenacity fiber cord.

European producers are using cord wire of many different constructions, beginning with a minimum total of 21 individual wire filaments in seven triple strands and extending to a maximum of 63 filament stranded in 21 three-wire cords.

The tensile strength of these wire cords extends from approximately 180 pounds to a maximum of 700 pounds, depending upon the strand-up of the individual cord.

Wire Cord Treatment

There is some difference in opinion as to the best method of carcass wire treatment both as to adhesion systems and as to calendering methods. First consideration will be given to the adhesion system.

Most tire wire is brass or zinc plated at the wire mill by continuous electrolytic methods after the wire has been drawn down to about 0.032-inch diameter. Later reductions to the final filament gage of 0.0058-inch retain this plating in sufficient thickness to assure adhesion of the rubber.

The zinc (or whatever) plating is retained in the final wire assembly. The wire is wound on convenient spools and is shipped in packages containing a desiccant to the tire companies.

These spools are creeled ahead of the calender in a conventional air-conditioned creel under accurately tensioned condition. The wire is calendered with rubber stock and then further processed in a more or less conventional manner. Such an arrangement, used quite generally, is shown on the left in Figure 11.

An alternate method of calendering in use today is the lamination method shown on the right-hand side of the same Figure 11. This method continuously applies previously calendered gum stock simultaneously to both sides of wire cord which is handled in a weftless sheet.

In an effort to increase the wire-to-rubber adhesion,

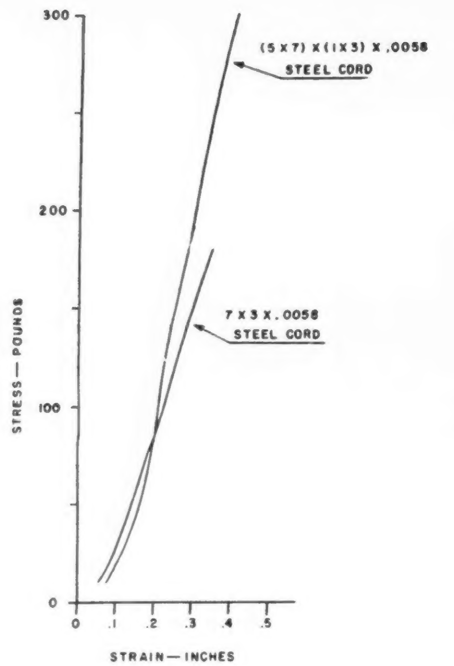

Fig. 10. Stress-strain curves for steel wire cords

some tire manufacturers are considering the use of unplated wire. The wire is continuously cleaned, degreased, plated, and cemented in web fabric form. This system is now undergoing development and is indicated in Figure 12. Several variations are also in process of design consideration for further evaluation.

The wire cord carcass performs well under adverse off-the-road service conditions. The low elasticity of wire strand is offset by its high tensile strength. Even in dual-tire applications under some tire conditions, stone pickup and consequential bruise between adjacent sidewalls do not cause unduly short carcass life.

Regular Wire Cord Tires

Basically two types of conventional wire cord truck tires are being produced in the U.S.A. at present. Figure 13 shows a conventional four-ply wire-cord constructed tire for medium-size truck use. The body plies are of conventional bias angle and bead warp. The undertread construction consists of one opposing angle breaker ply. In total, there are four body plies plus one breaker ply plus the tread. The photograph shows the buildup construction, of the heavy-duty type.

Figure 14 shows conventional tire construction, but used in total buildup of only two body plies. The bias angles are in the conventional range with the two wire breaker plies setting at opposing and conventional bias angles. Bead construction and tie-in are nearly conventional.

The tire performs very well under medium service conditions for normal non-off-the-road tires, such as bus and unpowered trailer use. It is generally a very cool running tire.

Special Wire Cord Tires

Figure 15 depicts the construction of the one-ply radial-type tire, very well known as French Type X construction. The sidewall proper consists of one single radial ply of wire cord fabric extending from the bead wrap area, around the sidewall and crown and the undertread portion of the tire cross-section.

The crossover angle, as such, is 180 degrees or 0 degree, depending upon the individual conception of tire design. In any event, the reinforcing cords run from bead to bead at an angle of 90 degrees from the bead.

Directly on the first radial ply a narrow circumferential extension ply is positioned on the tread centerline. This extension band has a very low bias angle in relation to the first-ply 90-degree bead angle.

Additional and wider wire cord breaker strips are next positioned under the tread proper, and these generally diminish in width in relation to the tire and tread cross-section.

This tire construction provides a very flexible sidewall construction which minimizes sidewall temperature buildup. The five additional undertread breakers assure an undertread support of a very firm nature. The tire provides exceptionally long tread life due to this firm undertread platform. The single-ply sidewall provides easy riding qualities and good springing characteristics.

Glass-Fiber Tire Cord

Another material which appears to be gaining attention in current research for tire use is glass-fiber tire cord.

As long ago as 1940 the possibility of glass-fiber tire cord was a long-range goal of the producers of that material. In fact, at that time, considerable theoretical

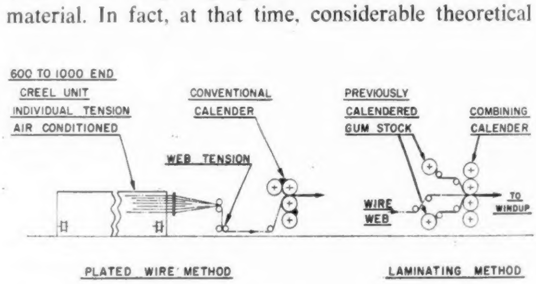

Fig. 11. Two methods of treating wire fabric for wire cord tires involving calendering with the rubber stock

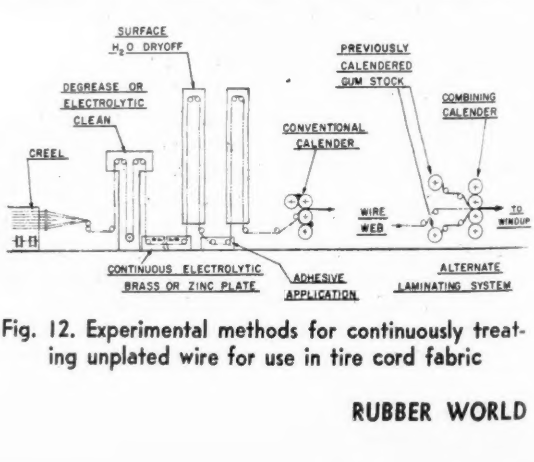

Fig. 12. Experimental methods for continuously treating unplated wire for use in tire cord fabric

Firestone Tire & Rubber Co.

Fig. 13. Cutaway view of a conventional four-ply wire cord tire

Fig. 14. Cutaway view of a conventional wire cord tire using only two plies

Fig. 15. Cutaway view of the one-ply radial wire cord tire well known as French Type X construction

research was carried on to determine the then-best methods of cord treatment, adhesion systems, and building technique to utilize this material.

In 1945 a full-scale development program was undertaken by one tire company and a glass-fiber company to develop a glass-fiber cord tire. Passenger-car tires were built of glass cords using filament construction and low rate of twist which were then deemed practical. The filament was finally woven into suitable familiar-type fabrics and subsequently treated.

Cord and fabric constructions were designed at that time in full cognizance of the high strength of glass filament and the high self-abrasion of the material. High rates of internal cord chafing were suspected, and the fabric and tire design supposedly took these conditions into full consideration.

The cord fabric was woven and pre-adhesive treated with a solution-type adhesive used with nylon cord prior to treatment with resorcinol-formaldehyde latex. After this first adhesive treatment the cords were given a suitable and familiar RFL treatment in preparation for the actual bonding of the cord to the rubber. The fabric was then calendered with rubber in the usual manner.

The tire construction used was conventional with normal ply and bias angles and conventional rubber compounds, tread designs, bead wraps, and the like.

Despite the high strength of the warp cords, the experimental tires produced disappointing results, due to the filament self-abrasion which was partially expected. The tires failed in less than 100 miles of use.

Most recent U.S.A. development work on glass tire cords has utilized glass woven cords, a different cord end count, and silicone rubber. These developmental tires had the expected ability to withstand temperature greatly in excess of the conventional tire because of the silicone rubber used. In fact, temperature ratings 100-110% higher than those of any conventional rubber tire yet produced were actually obtained.

This particular tire utilized a different tire cord construction system, a different adhesive system, and, because of the utilization of silicone rubber, a relatively special building and processing technique. The end-results were more significant than the previous earlier attempts. The combining of glass and silicone rubber in a pneumatic tire form to withstand extremely high temperatures was a marked step forward.

The new viewpoint considered glass as a material of high tensile strength, low extensibility, and a short rupture cycle. This inherent characteristic of glass (neglecting its self-abrasion) led to the conclusion that the tire design, as such, should be patterned after a wire cord tire-type construction and not a fiber cord-type tire construction.

Test tires have been built and wheel and road tested. Results were better than those of previous efforts. The test tires failed again because of filament abrasion and adhesion difficulties. Cord breakage and ply and tread separation at 1,000 miles or 1,100 miles were the high average test result.

Despite the rather negative results in the past, there is a current interest in glass-fiber tires outside the United States by major producers employing competent research and development personnel. A special glass-fiber laboratory is being planned for continuing these special efforts.

Glass-to-rubber adhesion, ply-to-bead adhesion, and specialized tire construction are being objectively studied. A main effort is being applied to filament finishes or lubricant to reduce abrasion and, therefore, to increase fatigue life. Some marked improvements in this direction have been noted to date, and this work will most probably be intensified in the near future.

Although these developments in glass fibers are not

on a scale beginning to approach a major effort to develop new tire cord materials, there are the apparent possibilities that the technical problems are reasonably near a practical solution.

Figure 16 depicts a typical elongation curve of a fairly successful glass filament cord.

Figure 17 shows a photomicrograph of the type of glass cord used in tire construction. The cord finish is unknown, but the ply-up and twist of this sample produced some very good results. Cords of slightly different constructions are now being used in experimental tires.

The pretreatment of glass-fiber cord is indeed somewhat more complex than the treatment of fiber cords. The problem of the wax or other filament finishes is receiving special consideration. Assuming that the filament finish is suitable for adhesive treatment, the usual pretreatment follows.

A typical rundown of the process steps which are now being evaluated is shown in Figure 18. The initial treatment of the glass cord consists of an anti-abrasive treatment applied directly to the desized cord fabric.

An adhesive dip which has been previously worked on as much as the resorcinol-formaldehyde dip is now being considered from the standpoint of a different chemical approach.

In an overall net respect, the pretreatment prior to calendering is yet to be worked out on a practical basis, but there are considerable reasons to believe, barring other factors, it will be a success.

The Polyurethane Group

The fiber industry has long suspected that the polyurethane family would likely provide a monofilament of exceptional good fatigue and tensile characteristics.

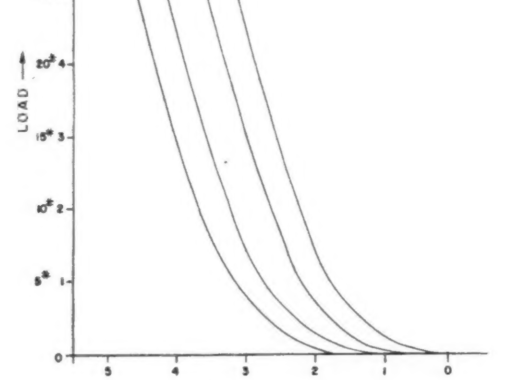

Fig. 16. Typical elongation curves of glass-fiber cords (150/2/3/2) which were successfully used in a tire construction

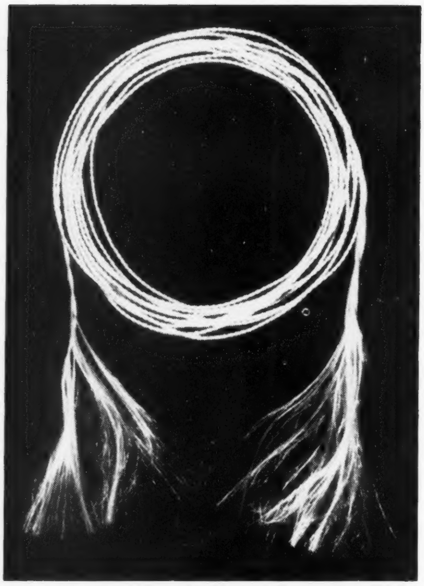

Fig. 17. Photomicrograph of glass cord used in tire construction

It was reported that several years ago the European fiber industry in cooperation with its chemical industry had developed an all-polyurethane tread and polyurethane fiber carcass. It was likewise reported that the test wheel results indicated a tire life expectancy of 75,000 miles or more. It is expected that future announcements from Europe will verify these test mileages.

European announcements of the production of polyurethane fibers in heavy denier constructions give credence to the reports of tire cord of polyurethane, prevalent on the Continent for some time.

What future developments will be remains to be seen. Although no technical information has been given, the possibility of this fiber development becoming important is excellent.

Future Fiber Possibilities

The scope of this paper is tire fabric materials other than the conventional rayon and nylon. Several of these fibers, which are on the practical horizon, have been covered in sufficient summary detail to bring out the main characteristics of the fibers as tire reinforcing materials.

Several other fibers being produced here and abroad may have some qualifications for tire cord use. All are relatively little known fibers, but the producers of each feel that, with future development and advances, these fibers may find their way into the large tire cord market because of their apparent suitability.

Polypropylene is a new fiber now produced in the U.S.A. which seems to show some promise. Although it is generally thought to be deficient in thermal qualities, there is a likelihood that this seeming deficiency can be

overcome. Other known qualities of polypropylene point to some tire use possibilities. Future announcements to this effect may be forthcoming. If the preliminary tests prove the material suitable, it is quite likely the tire development work will proceed at an increased pace.

A new Japanese fiber development is a material called Urylon.[11] It is a chemical combination of urea and amide polymers and is currently in pilot-plant production. The original-use conception of its developers was for apparel textile purposes, and, as such, in the recent past, developmental work has been restricted to this end-use.

The material, in its present state, develops about 6-7 grams per denier tenacity, has ultimate elongations of approximately 22%. The stress/strain conditions at 5 and 10 pounds seem adequate. The moisture resistance of Urylon is good, under any and all moisture temperatures. The thermal stability, so far as it is known, is equal to that of conventional accepted cords.

Little work on tire cord use has been done on this material to date, and, so far as is known, the adhesion system is still undeveloped. Its present cost will be reasonably good, especially when volume of the material builds up.

It is anticipated that future test work for tire use of this material will be done in the U.S.A. in the near future, and if preliminary results prove successful, further tire test work will be done either in the U.S.A. or abroad.

Non-Fiber Developments

Among recent developments, not strictly dealing with fibers or cords, but which have some bearing on the overall tire, is the recent announcement of the polyurethane foam-filled rubber tire.

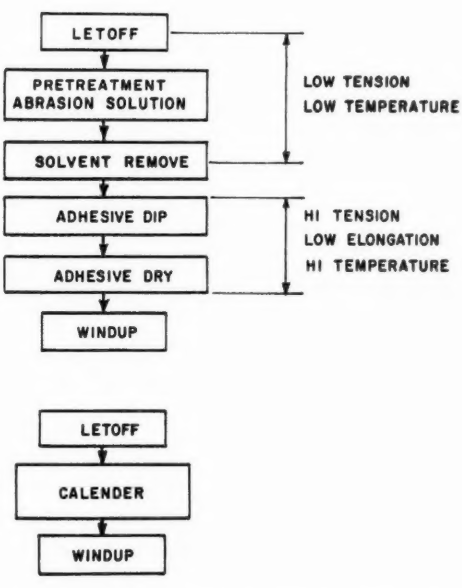

Fig. 18. Process steps in treating glass cord for tire fabric use

The use of semi-rigid polyurethane foam obviates the use of inner tubes, inner lining, or any other air-retaining membrane within the tire. As a result, the problems of blowouts and, indeed, of air losses of any type are completely eliminated. The tire is claimed to be completely roadworthy and safe even under conditions where an air-inflated tire, whether tubeless or dual-tube type, would certainly fail.

A similar development was observed with a different carcass construction more than two years ago in Europe. The European experimental tire had a carcass completely molded of polyurethane, filled with a premolded inner ring (or rings) of cellular polyurethane. Reports at the time indicated a tire of extreme indestructibility and safety. This development certainly is significant.

It will be readily admitted that, as of now, these experimental tire designs and construction materials are manufactured on a strictly handmade basis and their practical volume production may never occur. The point must be accepted, however, that the ideas have been conceived, and the preliminary techniques have been worked out, and, in fact, the road tested tires are a reality.

Summary and Conclusions

This paper has been a sincere attempt to provide an objective analysis of current developments and future probabilities in tire cord fabric and tire construction. It is based on information reported by persons of authority with every effort made to deal only with confirmed data.

Discussion of future developments is subject to the usual limitation, i.e., that the data made available by individual companies may not be absolutely complete owing to confidential restructions.

To sum up the present situation, one may conclude that:

1. Cellulosic fibers, since their technical reincarnation, are providing a serious comeback for the all-important tire cord market.
2. Nylon 66 materials undoubtedly will continue to achieve important technical advances and commercial gains in the premium tires in passenger and other sizes.
3. Wire reinforced tires most probably will double in production quantities in the next several years. Emphasis will be on bus and city truck uses on firm and relatively smooth pavement surfaces.
4. Improved caprolactam-based fibers will increase in use volume in near-direct proportion to the cost of this material in comparison to cellulosic and amide materials.
5. The other newer and commercially untried materials mentioned will certainly make a strong future bid for the large markets for tires. The polyesters, most probably, will be the first of the serious contenders. Other fibers mentioned are not nearly so advanced in this direction, either commercially or technically.

[11]Toyo Koatsu Co., Osaka, Japan.

A Method of Screening Antiozonants[1]

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He joined the Firestone Footwear Co. in 1922 and advanced to chief chemist in 1924. In 1936 he became superintendent of the United States Rubber Co. heel and sole plant and after a short time went to American Cyanamid as head of the rubber chemistry laboratory. He was advanced to his present position in 1953.

Mr. Davis is a member of the American Institute of Chemists, the American Chemical Society and its Rubber Division, the New York Rubber Group, and the Akron Rubber Group.

THE value of an organic compound as an antiozonant in rubber can be determined only by testing it in a rubber formulation under conditions to be met in service. The present state of this art has been reviewed by Biggs (1).[2]

In a broad sense, any organic compound is an antiozonant since there are few compounds that do not react with ozone in some manner. For a compound to be a good antiozonant in rubber, however, it must prevent the reaction of ozone with the unsaturated hydrocarbons in rubber. In other words, the compound must react with ozone preferentially at a faster rate than ozone reacts with an unsaturated hydrocarbon.

The excellent reviews of Long (2) and Bailey (3) cover the reactions of organic compounds with ozone in general with a few references to the relative rates of reaction. In one experiment by Barnard (4), he reports the preferential reaction of ozone with octene-1 when an equimolecular mixture of this olefin and di-n-butyl sulfide were reacted with ozone. The extent of the reaction, however, is based upon infrared analysis of the products formed.

Delman, Simms, and Allison (5) have proposed a method of evaluating the protective ability of "antiozidant chemicals" that uses the rate of change of viscosity of "polymeric solutions."

The basis of the new procedure described here is to evaluate compounds according to their inherent ability to react preferentially with ozone at a faster rate than ozone reacts with an unsaturated hydrocarbon. This type of screening evaluation effectively separates compounds into two classes—those that should be tested in rubber and those that should not.

Principle of the Method

A good antiozonant is defined as one that inhibits the olefin-ozone reaction by reacting preferentially with the ozone present. To compete successfully with the unsaturated linkage of a hydrocarbon for ozone, an antiozonant must react with ozone at a faster rate than the unsaturated hydrocarbon. The degree to which a compound can compete successfully with the unsaturated linkage of a hydrocarbon for ozone can be determined by measuring the oxygen content of a stream of ozonized air after it has passed through a mixture of the compound and an excess of unsaturated hydrocarbon.

In this method an air stream containing 21% by volume oxygen and 79% by volume nitrogen is ozonized

[1] Presented before the Division of Rubber Chemistry, A.C.S., Los Angeles, Calif., May 13, 1959.
[2] Numbers in parentheses refer to Bibliography items at end of this article.

A Method of Screening Antiozonants

Testing organic compounds as antiozonants in rubber has been a time-consuming task involving considerable man-hours of work. Research time can now be shortened as the result of a newly developed method for screening organic compounds. This method separates compounds into two classes—those that should be tested in rubber and those that should not.

This method is based upon the ability of a compound to react preferentially with ozone in the presence of an unsaturated hydrocarbon. In this method a stream of ozonized air is passed through a solution of the compound and an excess of an unsaturated hydrocarbon in a solvent, which solvent is inert toward ozone. The preferential reaction of the compound with ozone is determined by analyzing the air stream before and after it is passed through the solution. The comparative reactivity of several classes of organic compounds evaluated by this method is compared to the reactivity of known antiozonant, which is used as a reference standard.

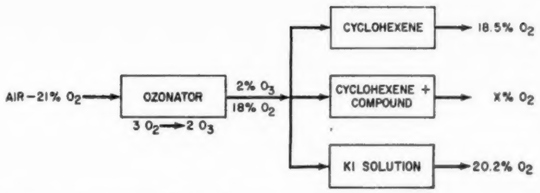
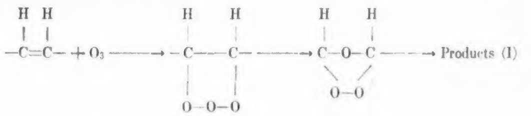


Fig. 1. Reaction flow diagram of air through ozonator and then through the two reference trains, cyclohexene and KI solution, as well as test compound

by passing it through an ozonator. The ozonized air stream is then passed through a solution of the compound under test as an antiozonant and an excess of an unsaturated hydrocarbon, cyclohexene, in a solvent that is inert toward ozone. A control reaction is run simultaneously by passing the same stream of ozonized air through a potassium iodide solution. Measuring the effluent air streams for oxygen content determines the value of a compound as an antiozonant.

Unsaturated hydrocarbons react with ozone in the three-atom manner:



In this reaction, also known as ozonation, three atoms of oxygen are consumed, and an ozonide is formed. A measurable volumetric decrease in oxygen content also occurs.

Cyclohexene, which is used as the model unsaturated hydrocarbon in this method, reacts with ozone in the three-atom manner to form a polymeric ozonide that can be handled safely (6-10). The effluent air stream from the cyclohexene-ozone reaction has the following % by volume composition: 18.55% O_2 and 81.45% N_2. The original air stream (21% by volume O_2 and 79% by volume N_2), in passing through the ozonator and through the cyclohexene, has undergone a decrease of 2.4% by volume of oxygen (11).

Potassium iodide, which is used as the control in this method, reacts with ozone in the one-atom manner:

$$2KI + O_3 + H_2O \longrightarrow I_2 + O_2 + 2KOH \qquad \text{(II)}$$

In this reaction, which serves as a model for the oxidative reaction of ozone, for each molecule of ozone, one atom of oxygen is consumed. The other two atoms of oxygen combine to form a molecule of oxygen.

The effluent air stream from the potassium iodide solution has the following percent by volume composition: 20.2% O_2 and 79.8% N_2. Compared to the volumetric content of the original air stream, the effluent stream from the KI-ozone reaction exhibits a decrease of 0.8% by volume of oxygen.

If the stream of ozonized air is passed through a solution of a compound to be tested in a solvent inert to ozone, the compound may react with the ozone in the stream in three ways:

One-Atom Manner—Oxidation by Ozone Alone

$$\text{Compound} + O_3 \longrightarrow \text{Oxidized Compound} + O_2$$

Three-Atom Manner—Ozonation

$$\text{Compound} + O_3 \longrightarrow \text{Ozonized Compound}$$

Ozone Catalyzed Oxidation by the Oxygen in the Stream

$$\text{Compound} + O_2 \xrightarrow{O_3} \text{Oxidized Compound}$$

The oxygen content of the effluent from the reactor containing the compound alone should indicate which type of reaction is taking place. If the one-atom reaction predominates, the oxygen content of the effluent is similar to that obtained from the potassium iodide reaction illustrated in equation II. The effluent from a compound reacting in the three-atom manner should have an oxygen content similar to that obtained for the olefin-ozone reaction shown in equation I. If ozone catalyzes the oxidation of the compound by the *oxygen* in the stream, the effluent has an oxygen content dissimilar to the other two. These reactions are shown in Figure 1.

Determining the manner in which a compound alone reacts with ozone is not a true indication of the value of the compound as an antiozonant in rubber. In this method, therefore, instead of subjecting the compound alone to the stream of ozonized air, the compound is reacted with the ozonized air stream in the presence of an excess of the unsaturated hydrocarbon, cyclohexene. The oxygen content of the effluent from the mixture is measured over a course of time.

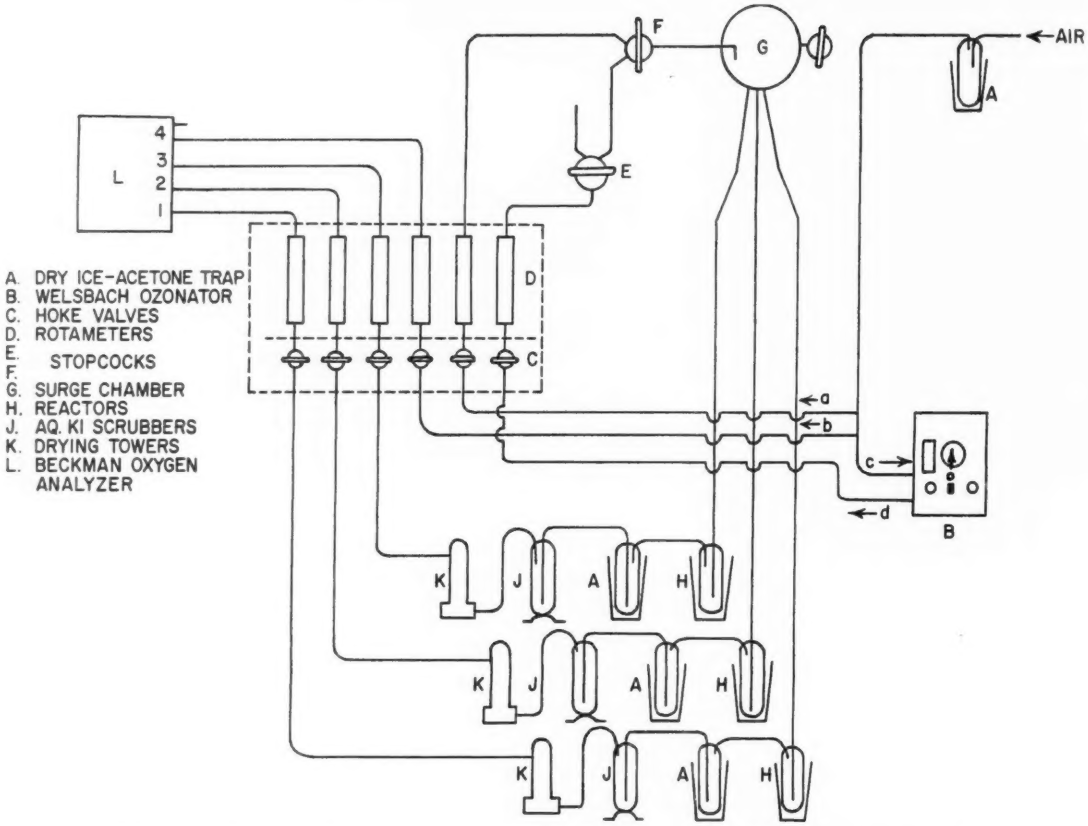


Fig. 2. Schematic diagram of the equipment used for this screening method for selecting antiozonants

The character of the curve resulting from the plot of oxygen content *versus* time indicates to what degree the compound reacts preferentially with ozone in the presence of an unsaturated hydrocarbon. The real antiozonant value of compounds that can successfully compete for ozone in this test, however, must still be determined by testing the compound in a rubber recipe under conditions to be met in service.

Description of the Apparatus

Figure 2 shows a schematic diagram of the ozonation train. Breathing air is led from a cylinder at 10 psig. through an acetone dry ice trap, A, and is divided into three streams. Stream (a) passes through one of the rotameters D to the manifold G (surge chamber). This stream is used for flushing the apparatus with air. The second air stream (b) passes through a rotameter to the Beckman oxygen analyzer,[3] L. This stream is used to calibrate the oxygen analyzer. The third air stream (c) flows into the Welsbach ozonator[4] (Model T-23) designated in diagram, B. The ozonator converts this air stream, which contains 21% by volume of oxygen, to a stream containing 18.5% by volume oxygen and 2% by volume ozone. From the ozonator, the stream (d) of ozonized air passes to the manifold (G), where it is divided into three streams that are fed to the train proper.

Each of the three trains contains a reactor H, shown in more detail Figure 3, which is maintained at O° C. in ice water. The reactors H are followed successively by:

A freeze-out trap (A) maintained at temperatures of —78° C. with dry ice and acetone.

A KI scrubber (J) containing 4% aqueous KI maintained at room temperature (the scrubber removes residual ozone from the stream to protect the oxygen analyzer.)

A drying tower (K) of anhydrous $CaSO_4$.

The stream in each of the three trains passes through its separate rotameter (D) to the oxygen analyzer. By adjusting the rotameters, an even rate of flow for each stream through its train can be maintained. A picture of the assembly is shown in Figure 4.

The Beckman oxygen analyzer, Model F-3, with Speedomax[5] recorder is used to determine the % by volume of oxygen in the streams from each of the three trains. Each stream is analyzed separately at ten-minute intervals. The oxygen analyzer is calibrated by means of the air stream (b) to record in the range 16-21% by volume of oxygen with an accuracy of ± 0.02%.

[3] Arnold O. Beckman, Inc., South Pasadena, Calif.
[4] The Welsbach Corp., Philadelphia, Pa.
[5] Leeds Northrup Co., Philadelphia, Pa.

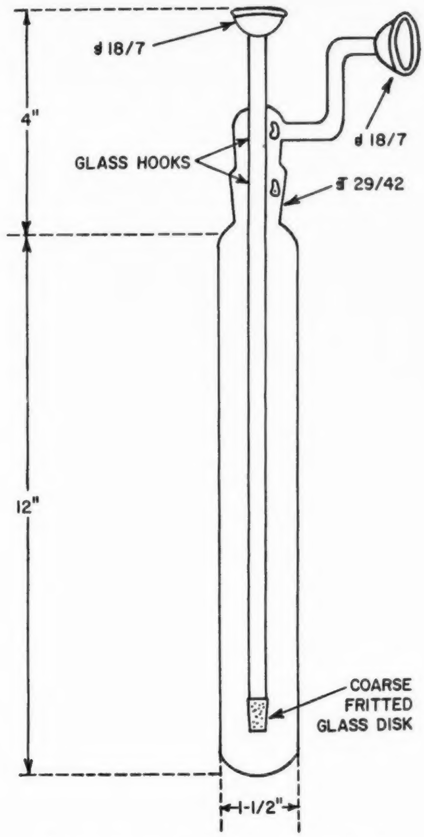


Fig. 3. Reactor used in this method

Operation of the Train

A 0.01-mol sample of the compound to be tested as an antiozonant and 0.5-mol of cyclohexene are dissolved in 75 milliliters of carbon tetrachloride. The solution is placed in a reactor (H), shown in Figures 2 and 3, and chilled to 0° C.

The ozonized air stream is passed simultaneously through the train containing the compound under test and through a blank train, which does not contain a compound, at the rate of 140 milliliters per minute. With a stream containing 2% by volume of ozone, this rate is equivalent to 1.34×10^{-4} mols of O_3 per minute.

The % by volume oxygen of the effluent streams from each of the two trains is recorded alternately on the analyzer at ten-minute intervals. The recorder of the analyzer plots % by volume oxygen *versus* time. About 40-50 minutes are usually required to obtain sufficient data from the recorder to interpret the results.

The third train is then subjected to the stream of ozonized air. The reactor of this train will contain a second compound or possibly a check run on the first compound tested as an antiozonant. In general, the assembly runs smoothly with only an occasional, minor adjustment of the flow rates, which permits the operator to recharge another reactor. Because of such continuous operation, five or six compounds may be evaluated per day.

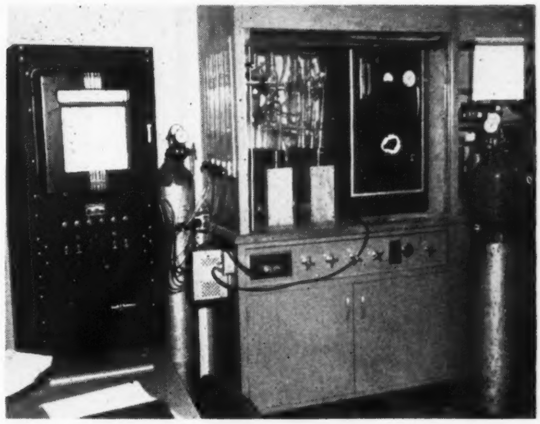


Fig. 4. Laboratory equipment used in this work, with the reactors at the left and the ozonator at the right under the hooded area

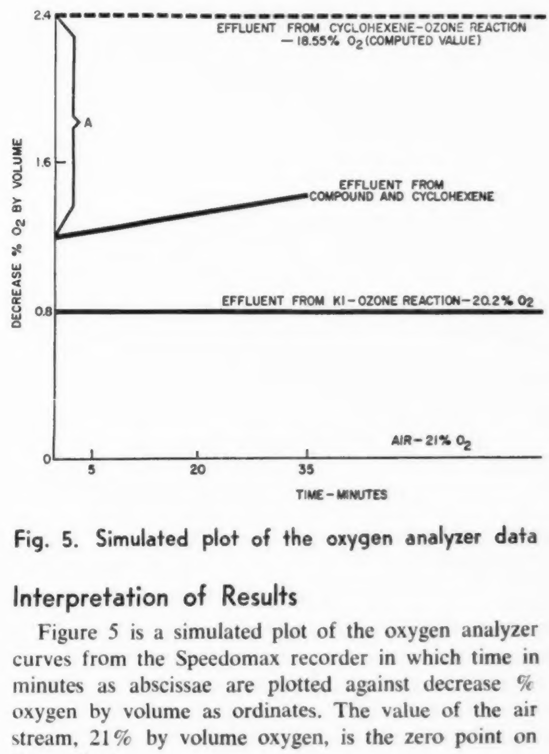


Fig. 5. Simulated plot of the oxygen analyzer data

Interpretation of Results

Figure 5 is a simulated plot of the oxygen analyzer curves from the Speedomax recorder in which time in minutes as abscissae are plotted against decrease % oxygen by volume as ordinates. The value of the air stream, 21% by volume oxygen, is the zero point on the ordinate.

The effluent from the blank KI-train gives a flat curve that indicates steady concentration of 20.2% by volume oxygen during the run, a decrease of 0.8% by volume in comparison to the oxygen content of the air stream.

Since the amount of ozone consumed by cyclohexene is three times the amount consumed by potassium iodide as shown in equations I and II, it is unnecessary to determine this curve. It can be plotted by computation.

The effluent stream from the reactor containing the mixture of compound and cyclohexene shows a progressive decrease in oxygen content in the course of

TABLE 1

N, N' -DIOCTYLPARAPHENYLENEDIAMINE

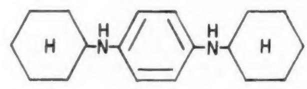
DECREASE % O_2 BY VOLUME

One-Atom Reaction	Three-Atom Reaction	Mixture	A
0.88	2.64	1.30	1.34
0.92	2.76	1.40	1.36
0.94	2.82	1.47	1.35
0.92	2.76	1.42	1.34
0.94	2.82	1.48	1.34

Experimental Error: ±0.02% by volume.

TABLE 2

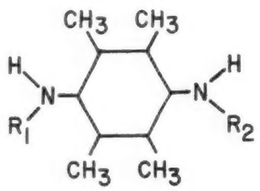
DERIVATIVES OF N, N'- DICYCLOHEXYLPARAPHENYLENEDIAMINE



	Comparative Reactivity
Reference Compound	100
N, N'-Dicyclohexyl	97
N, N'-Bis(3-methylcyclohexyl)	98
N, N'-Bis(4-methylcyclohexyl)	89
N, N'-Bis(3,5,5-trimethylcyclohexyl)	73
N, N'-Dicyclohexyl-N-2-hydroxyethyl	100
N, N'-Bis(2-hydroxyethyl)-N, N'-dicyclohexyl	101

TABLE 3

DERIVATIVES OF DIAMINODURENE

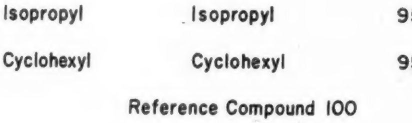


R_1	R_2	Comparative Reactivity
H	H	102
Isopropyl	H	95
2-Octyl	H	80
2-Octyl	2-Octyl	65
Isopropyl	Isopropyl	40

Reference Compound 100

TABLE 4

DERIVATIVES OF DIANISIDINE



R_1	R_2	Comparative Reactivity
2-Butyl	2-Butyl	101
Isopropyl	Isopropyl	95
Cyclohexyl	Cyclohexyl	95

Reference Compound 100

time when the compound is sufficiently active to compete successfully with the large excess (50:1) of cyclohexene present in the mixture. The slope of this line will vary with the activity of the compound.

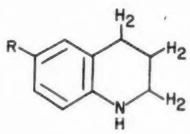
The intercept of this line on the ordinate at zero time, which is determined by extrapolation, is used in evaluating the compound. As shown in the figure, this intercept is at a distance "A" from the intercept of the cyclohexene effluent. The magnitude of "A" may be used to assign numerical values to a series of compounds to gage their potential as antiozonants.

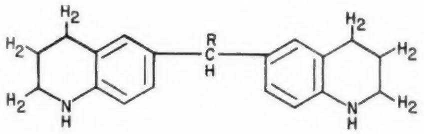
A known commerical antiozonant, N,N'-dioctylparaphenylenediamine,[6] is used as the standard for comparison in the method. Table 1 illustrates the duplicability of results for determining the "A" value for the reference compound. The figures in the "one-atom reaction" column are the values taken by reading at zero time the intercept value of the oxygen analyzer curve for

[6] UOP 88, Universal Oil Products Co., Des Plaines, Ill.

TABLE 5

DERIVATIVES OF 1,2,3,4-TETRAHYDROQUINOLINE





	Comparative Reactivity
Reference Compound	100
1,2,3,4-Tetrahydroquinoline	77
6-Methyl-1,2,3,4-tetrahydroquinoline	110
6-Cyclohexenyl-1,2,3,4-tetrahydroquinoline	96
1,1',2,2',3,3',4,4'-Octahydro-6,6'-biquinoline	105
6,6'-Cyclohexylidenebis(1,2,3,4-tetrahydroquinoline)	110
6,6'-Methylenebis(1,2,3,4-tetrahydroquinoline)	103

the effluent from the blank KI-train on the decrease % by volume oxygen ordinate. These values, which are read as a decrease in % by volume of oxygen from the unozonized air stream, range from 0.88 to 0.94 for minor fluctuations in ozone content of the ozonized air stream.

The values in the second column are those for the "three-atom reaction" and are computed by multiplying the values in the first column by three. They are values for the decrease in % by volume oxygen for the effluent from the reaction of the ozonized air stream with cyclohexene.

The third column lists the values for the decrease in % by volume oxygen for the effluent from the mixture of 0.01-mol of N,N'-dioctylparaphenylenediamine and 0.5-mol of cyclohexene dissolved in carbon tetrachloride. These values are taken from the intercepts of the effluent oxygen analyzer curves for this solution on the decrease % by volume oxygen ordinate at zero time.

The "A" values in the last column are computed by subtracting the values in column three from those in column two.

In the following tables showing the comparative reactivity of some of the compounds tested, the ratio of the experimentally determined "A" value for the compound under test to the experimental value of the reference compound, 1.35, is multiplied by 100 to obtain larger whole numbers.

$$\text{Comparative Reactivity} = \frac{\text{"A"}}{1.35} \times 100$$

Discussion of Results

Tables 2 to 6 show the results obtained by this method on a series of compounds that have activities in the range of the reference compound, N,N'-dioctylparaphenylenediamine. Table 2 shows the comparative reactivities of a series of derivatives of N,N'-dicyclohexylparaphenylenediamine. Four of these derivatives show activities comparable to that of the reference compound. Decrease in activity with an increase in the number of methyl substituents on the cyclohexene ring is evident in the case of N,N'-bis(3,5,5,-trimethylcyclohexyl)paraphenylenediamine.

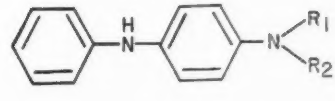
The last two derivatives are examples of the effect of introducing a third substituent, the hydroxyethyl group, into the molecule. No sacrifice in activity occurs by this modification. There is effected a marked decrease in the volatility of this product compared to the starting material. All of these compounds are crystalline solids.

Table 3 lists the comparative reactivities of derivatives of diaminodurene. This is an interesting series in view of the findings reported by Andrews, quoted by Bailey(10). In this work, the bimolecular rate constant for the ozonization of methylated benzenes was found to increase considerably with the number of methyl groups on the ring and to reach a maximum of 15,000 for hexamethylbenzene compared to 1.9 for benzene. In the diaminodurene series shown, activity was found to decrease with increasing substitution on the nitrogen atoms with the least activity shown by the N,N'-disubstituted derivatives.

Three derivatives of dianisidine whose reactivity is

TABLE 6

DERIVATIVES OF N-PHENYLPARAPHENYLENEDIAMINE



R_1	R_2	Comparative Reactivity
H	Cyclohexyl	98
H	2-Octyl	90
Ethyl	Ethyl	86
H	3-(5-Methylheptyl)	81
H	2-Butyl	75
H	Isopropyl	75
	Reference Compound	100

comparable to the reference compound are shown in Table 4. These compounds are crystalline solids.

A number of derivatives of quinoline have been evaluated by our method. A selection from this collection is shown in Table 5. Examples of two classes, both derived from 1,2,3,4-tetrahydroquinoline, were chosen. The 6-methyl and 6-cyclohexenyl derivatives, compared to the unsubstituted 1,2,3,4-tetrahydroquinoline, show enhanced activity. The second class is representative of higher molecular weight derivatives of 1,2,3,4-tetrahydroquinoline joined in the 6,6′-positions which show activities comparable to those of the reference compound.

Table 6 shows a series of compounds derived from N-phenylparaphenylenediamine.

Limitations of the Method

Carbon tetrachloride has been found to be an acceptable solvent for the method. It is relatively inert toward ozone and readily available in a high state of purity. In working with this solvent, we have found that there is a very slow, but nevertheless perceptible, reaction of spectrograde carbon tetrachloride with ozone at 0° C. In the course of 50-minute exposure to 2% by volume ozone, however, this reaction did not alter our results.

Compounds that will not dissolve in carbon tetrachloride at a concentration of 0.01-mol per 75 milliliters at 0° C. in the presence of 0.5-mol of cyclohexene are discarded. Solubility of the compound in carbon tetrachloride alone is also used as a preliminary screen. Spot checking of carbon tetrachloride insoluble compounds has shown that they are usually too insoluble in rubber to perform as antiozonants.

Some compounds tested by this method have not given smooth plots on the oxygen analyzer that permitted extrapolation of the curve to zero time. These have been relatively few. Most organic compounds give smooth plots that fall within the area of the three-atom and one-atom reaction curves.

In a few instances curves with extremely steep slopes have been encountered. This result indicates ozone-catalyzed oxidation of the compound by the oxygen in the ozonized air stream. In these cases competition by the compound with the cyclohexene for the ozone in the stream is short-lived. The indicated potential antiozonant activity of the materials producing these curves, therefore, is little.

Summary and Conclusions

A method has been developed for screening compounds for potential antiozonant use based upon the ability of the compound to suppress the reaction of ozone with cyclohexene when a mixture of the two is subjected to the action of a stream of ozonized air. The method is satisfactory as a tool for selecting compounds for testing in rubber.

In a rubber formulation, however, there are many factors concerned with the functioning of a compound as an antiozonant in addition to its ability to react preferentially with ozone at a faster rate than the unsaturated linkages in the rubber(12). Testing the most promising compounds in a rubber formulation is required to establish their commercial value as antiozonants.

Acknowledgments

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"Ludox"—Urethane Foam Filler

"Ludox," which has been reinforcing foam rubber for some time, is now stiffening the cells in polyester urethane foams, according to the industrial and biochemicals department, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., manufacturer of the colloidal silica. The filler treatment is said to increase load carrying capacity by 50%. The effect is permanent, lasting throughout the useful life of the foam, reports the Du Pont company.

The treatment consists of dipping a block or molded article of foam into a dilute water solution of "Ludox" and then drying it. The result is permanent improvement in compression resistance while using less foam. This means a sizable saving for both the user and the producer of urethane foams.

"Ludox," being an aqueous sol, is easy to dilute with water to the desired SiO_2 concentration. This is determined by measuring how much solution the foam picks up under actual treating conditions. For example, if the foam manufacturer needs a 4% SiO_2 pickup to get the desired compression, and his foam is found to pick up half of its weight of solution, it will be necessary to use an 8% SiO_2 solution in the bath.

Studies suggest that treated foams would be good for crash padding and for packing fragile items, for upholstery for furniture and automobiles, rug underlays, and wall tile, as well as for air filters for air conditioners.

MEETINGS and REPORTS

Butyl Talks at NYRG Draw Crowd

Some 250 members and guests of the New York Rubber Group attended the fall dinner-meeting held at the Henry Hudson Hotel, New York, N. Y., on October 16. The technical session consisted of three papers on butyl rubber: (1) "Brominated Butyl and Its Applications," by C. H. Lufter, B. F. Goodrich Chemical Co.; (2) "Dynamic Properties of Butyl," by R. M. Cardillo, Enjay Laboratories, Inc.; and (3) "Butyl Rubber in Automobile Tires," by R. F. Leary, Enjay. Summaries of these papers follow.

Technical Session

The excellent properties of butyl rubber are retained, and some of the troublesome characteristics eliminated by the addition of a small amount of bromine to the butyl polymer, explained Mr. Lufter. This type of modification produces a rubber with an increased cure rate, increased compatibility with other polymers, good adhesion to metals and other rubbers, and the advantages of a polymer with active centers susceptible to new cure systems. Application is seen where adhesion of butyl is a problem, for example, tire innerliners and recapping; where cure rate is vital, such as cable jacket and most molded parts; where blends with other polymers are preferred, as in white sidewalls and parts for special chemical resistance; and where new cure systems are used, such as the methylol phenol and dithiol systems.

The second speaker, Mr. Cardillo, proclaimed that the unusual dynamic properties of butyl rubber are leading to its increased usage in a wide variety of applications. High energy absorption or damping is a property of particular interest. The butyl chain is almost entirely composed of polyisobutene with a very small amount of isoprene. The polyisobutene structure has high chain symmetry and many side groups, and these contribute to the restricted chain movements that account for high damping.

High damping, continued Mr. Cardillo, can be utilized in many applications where controlled elasticity and absence of bounce and recoil are helpful. Damping is also useful in many vibrational control problems, and this factor has led to an increasing use of butyl in this field by the automotive industry.

A new test method has been developed to evaluate butyl's dynamic properties. This method is unique in that it utilizes a high-speed stress relaxation test to obtain dynamic modulus and loss information under condition of cyclic deformation. The great flexibility of this method with regard to strain level, frequency, and temperature makes it an ideal tool for general-purpose studies of dynamic behavior. These studies can be used to predict the response of butyl rubber in many new applications.

Mr. Cardillo concluded his interesting talk by showing a short film which demonstrated a practical application for utilizing the dynamic damping properties of butyl rubber. In this instance, experimental highway guard rail posts were made of butyl rubber and, when smashed into by an automobile moving at 55 miles per hour, served effectively to stop the car without damaging it.

Rubber Age

E. S. Kern (current program chairman), and C. H. Lufter, R. M. Cardillo, and R. F. Leary (guest speakers)

The final technical speaker, Mr. Leary, initiated his talk on butyl tires by showing a 15-minute movie on the subject. Stressing the commercialization of butyl rubber passenger-car tires, the film indicated that butyl rubber tires have these advantages: (1) improved traction; (2) soft ride; (3) no squeal; and (4) excellent age resistance. Mr. Leary then elaborated on these points and mentioned some of the problems which had arisen in the development of the butyl tire program. These problems included carcass and bead durability, tread wear, and material and construction costs. The speaker indicated how these problems have been solved since 1952 to such a degree as to make possible the recently introduced butyl rubber passenger-car tire.

Rubber Age

New officers: *(left to right)* C. J. Lewis, sergeant-at-arms; E. S. Kern, chairman; H. J. Peters, vice chairman; M. E. Lerner, secy.-treasurer

New Officers and Directors

The results of the letter-ballot election of officers and directors for 1960

Rubber Age

Frankie Frisch (dinner speaker)

held in accordance with the new by-laws of the recently incorporated group were announced. These results were as follows: chairman, Ervin S. Kern, R. T. Vanderbilt Co.; vice chairman, Henry J. Peters, Bell Telephone Laboratories; secretary-treasurer, M. E. Lerner, *Rubber Age;* and sergeant-at-arms, Clifford J. Lewis, United States Rubber Co. The new directors will be W. R. Hartman, Laurie Rubber Co., and M. A. Durakis, General Cable Corp., from the consumers; and J. E. Walsh, Stamford Rubber Supply Co., and J. T. Dunn, Thiokol Chemical Corp., from the vendors.

The Group was recently incorporated in the State of New York, and because of a slight name similarity with another corporation it was necessary to change the name to The Rubber Group of New York, Inc., but it is expected to remain the New York Rubber Group in popular parlance. It was to satisfy the legal requirements of this incorporation that the by-laws were changed.

Dinner Program

The after-dinner speaker was Frankie Frisch, one of the greatest major league players and managers of his time. Frankie, in his "Reminiscences of a Big Leaguer," recounted his many experiences as player and manager of the New York Giants and the St. Louis Cardinals and his problems with some of the other baseball greats of his time. During the period of his managership, each team won four league pennants and were the World Champions twice.

Both Frankie and the audience enjoyed a question-and-answer period in which some of the lesser known facts about players and umpires were detailed at some length.

The next meeting of the New York Rubber Group will be the annual Christmas party to be held at the Henry Hudson Hotel on December 18.

Fort Wayne Hears Talk on Solid Propellants

The first meeting of the 1959-1960 season of the Fort Wayne Rubber & Plastics Group was held in the ballroom of the Van Orman Hotel, Fort Wayne, Ind., on September 24. A delicious fried chicken dinner with all the trimmings was served to 147 members.

Francis X. Cunningham, The Thiokol Chemical Corp., Elkton division, Elkton, Md., gave a talk on "Compounding of Composite Solid Propellants," which was followed by slides and a sound movie. An abstract of his talk follows.

Solid Propellants Techniques

Composite solid propellants consist of a fuel/binder and an oxidizer. The fuel/binder is a polymer which is liquid initially and which can be converted to a rubbery solid under relatively mild conditions; the oxidizer is an inorganic crystalline solid.

The manufacture of composite solid propellants can be broken down into five general steps: (1) oxidizer preparation, which is a grinding operation that reduces the oxidizer to a specified particle size. Oxidizer particle size influences ballistic and processing properties of the propellant. (2) mixing. The oxidizer is dispersed throughout the liquid polymer to form a thick, semi-liquid mass of propellant. (3) casting. A mandrel or core is placed in the center of an empty motor case, and the semi-liquid propellant is cast into the annular space between the mandrel and the motor case wall. The casting operation is carried out under vacuum, and the motor case is vibrated in order to prevent bubble formation due to entrapped air. (4) curing. The motor is placed in an oven, and the semi-liquid propellant is converted to a rubbery solid at a relatively mild temperature. (5) finishing. The mandrel is removed from the motor, and excess propellant is cut away.

The design of the core used in the manufacture of the motor dictates the shape of the central propellant perforation which the finished motor will have. The thrust developed by a solid rocket motor is dependent on the propellant burning surface area which, in turn, is determined by the shape of the core. Thus cure design is a method by which the thrust level, and changes in thrust level during flight, can be preprogrammed during the manufacture of the motor.

Propellant compounding is in many ways analogous to rubber compounding. The propellant compounder is responsible for the physical, processing, ballistic, and safety properties of his propellants. To help him design propellants, data is fed back to him from several areas. Propellants strand burners and static test motors are used to determine the ballistic properties of formulations which are under development. Methods of predicting the specific impulse of solid propellant formulations by machine computations involving thermo-chemical data have been developed and provide valuable guides in selection of type and amount of binder and oxidizer to be used in meeting propellant specifications.

New Officers

The new officers of the Group for the coming season were in charge of this meeting: president, Walton D. Wilson, R. T. Vanderbilt Co.; vice president, Allen C. Bluestein, Anaconda Wire & Cable Co.; and secretary-treasurer, Arthur L. Robinson, Harwick Standard Chemical Co. Others include: chairman-membership committee, Edward T. Bosworth, Columbian Carbon Co.; menu chairman, Earl Gottschalk, Paranite Wire & Cable Co.; chairman-program committee, Allen Bluestein; and chairman-ticket committee, L. E. Rhodes, Goshen Rubber Co. Directors are: Devon Wilson, The General Tire & Rubber Co.; Al Brumfield, Belden Mfg. Co.; M. Whitefield, Naugatuck Chemical Division; Sam Armato and S. Shaw, Witco Chemical Co.; R. Knapp, United States Rubber Co.; R. Mack, Western Rubber Corp.; J. Porter, H. Muehlstein & Co.; and Phil Magner, Jr., The General Tire & Rubber Co.

The next meeting will be held on December 3, at the Van Orman Hotel.

McFadden before PRG

The fall meeting of the Philadelphia Rubber Group was held at the Poor Richard Club, Philadelphia, Pa., on October 2. Approximately 125 members and guests attended the meeting and heard C. P. McFadden, of The Rubber Manufacturers Association, Inc., New York, N. Y., address the Group on tariffs and import duties affecting the United States rubber manufacturers. He pointed out that American manufacturers want an equal opportunity to compete with low labor-cost foreign-made goods and that tariffs should equalize labor costs, giving all an equal opportunity to sell their merchandise in the United States.

The following officers and new directors were elected for the 1960 term: chairman, Henry C. Remsberg, Carlisle Tire & Rubber Co.; vice chairman, Richard N. Hendriksen, Phillips Chemical Co.; secretary-treasurer, Richard M. Kerr, Thermoid Co.; director, three-year term, Bernard Van Arkel, Walker Bros., and Kenneth E. Chester, C. P. Hall Co.; director, two-year term, William Macomber, United States Rubber Co.

"New Worlds of Rubber" Talk at NE Section

The twelfth year of the Elastomer & Plastics Group, Northeastern Section, American Chemical Society, commenced on October 13 at the Museum of Science, Charles River Dam, Boston, Mass., with 65 members and guests present to take part in the annual meeting, held after the dinner and cocktail hour, and to hear Milton J. Rhoad, chemical division, The Goodyear Tire & Rubber Co., speak on "New Worlds of Rubber."

In the absence of the retiring chairman, J. Horace Faull, Jr., consultant, the business meeting was conducted by the new chairman, James H. Fitzgerald, Harwick Standard Chemical Co. The nominations of the nominating committee, Max Taitel, UBS Chemicals, chairman, were accepted by a unanimous vote, following the reading of reports, and the slate of officers for 1959-1960 is therefore as follows: chairman, Mr. Fitzgerald, chairman-elect, Henry A. Hill, National Polychemicals, Inc.; secretary, Joseph M. Donahue, Goodyear; treasurer, E. Elmer Ross, T. C. Ashley Co.; and custodian, J. Laurence Powell, B. F. Goodrich Footwear & Flooring Co. Others named were hospitality committee chairman, Frank P. Canty, Angier Adhesives division, Interchemical Corp., and executive committee (three years) Donald F. Holloway, R. & M. Industrial Labs; (two years) B. B. S. T. Boonstra, Godfrey L. Cabot Co.; (one year) Juan C. Montermoso, Quartermaster R. & E. Command.

Mr. Rhoad presented slides and statistics in his talk on "New Worlds of Rubber," illustrating his viewpoint that the rubber industry is in a resurgent period of vigorous growth, due to the tremendous developments in synthetic rubber in the last two decades. His projected figures indicated steady upward trends of synthetic rubber production and consumption, of increasing proportionate amounts of synthetic to natural, worldwide as well as in America, and rapidly increasing capacities for synthetic production outside of the United States, in Europe and in Asia. Iron Curtain countries were not discussed.

In the summarizing of current synthetic production, one interesting tabulation showed the total number of synthetic rubber types produced in this country by the 20 producing companies to be 100 SBR types, 35 NBR types, 9 butyl rubbers, 14 neoprenes, three polysulfide rubbers, five fluorocarbon rubbers, and 15 miscellaneous types—a total of 181. The plant investment used to turn out the three billion pounds of an estimated 1959 synthetic rubber production worth $730 million was figured at $495 million.

In 1959, manufacturers of synthetic rubber products used 62.5% of SBR and 37.5% natural in tires, and 62.7% SBR in non-tire products, to raise United States per capita rubber consumption to almost 20 pounds of rubber. The rest of the world uses about two pounds of rubber per capita, he said.

In illustrations of the increasing acceptance of synthetic rubber outside of the United States, Mr. Rhoad stated that in 1940 the United States used 57.5% of all the new rubber used, but in 1959 its share was only 45%. With many new synthetic rubber production facilities planned in Germany, Italy, France, England, Japan, South America, and elsewhere, foreign consumption is expected to increase rapidly. Presently the United States exports one-fourth as much synthetic rubber as it uses itself. West Europe consumption of synthetic increased from 20-25% of all rubber used in 1957 to 40-45% in 1959.

Mr. Rhoad's talk concluded with the showing of a new 20-minute Goodyear film, "New Worlds of Rubber," showing the operation of the Houston, Tex., SBR plant, where 1.5 million pounds of elastomer are produced daily—the largest synthetic rubber plant in the country.

Machinery SORG Topic

Some 140 members and guests of the Southern Ohio Rubber Group attended the fall dinner-meeting at the Hotel Gibbons, Dayton, O., on October 8. L. E. Soderquist, vice president and director of engineering, McNeil Machine & Engineering Co., showed a 20-minute movie on molding equipment and presses and answered questions. The second speaker, D. C. Chase, Farrel Birmingham Co., Inc., showed slides for about a half hour, covering new equipment. The final speaker, Robert H. Kline, consultant, gave a talk entitled "Continuous Curing of Rubber Extrusions," a summary of which follows.

The LCM (liquid curing medium) continuous curing process is best suited to the manufacturers who are extruding various complicated shapes to close tolerances. The vacuum screw is a major aid in LCM curing, and it may also be used in conventional curing such as tire treads to remove trapped air for better dimensional control. A large manufacturer of electrical transformers is using the vacuum screw to injection mold large transformer cases which must be free of air pockets.

The rubber industry, continued Kline, is at least 15 years behind the younger plastic extruding industry. Much fine work has been done to determine the proper design for plastic extruders, and this work continues. The extruder is a powerful tool to convert plastic materials to usable shapes. It is now entering the injection molding field and has caused a great deal of enthusiasm on the part of its supporters.

Whether the extrusions used in industry are rubber or plastic depends in many cases upon application of the material. But in other cases it is a matter of price, appearance, and dimensional control. In these situations the rubber extrusions are losing out because nothing is being done to make them competitive. Continuous curing is a big step in this direction. But the main hurdle to jump is convincing management of the economic advantages of a planned, vigorous extruder research project. The extruder manufacturers will help, but the initiative must come from the people who are in daily contact with this equipment.

At the business session of the meeting the treasurer, secretary, summer outing committee chairman, and winter meeting committee chairman reported on their plans for the season. Also the educational committee outlined its program for 1959-60. The winter meeting (Christmas) of the Group will be held at the Miami Valley Golf Club, Dayton, O., on December 12.

Our Cover—Goodyear Medalist Fernley H. Banbury

Our cover illustration presents Fernley H. Banbury, who received the Charles Goodyear Medal of the Division of Rubber Chemistry, ACS, at the International Rubber Conference in Washington, D. C., November 10.

The citation of the award is, "For the invention, development and commercializing the Banbury internal mixing machine." One of the latest models of the Banbury mixer is shown with Mr. Banbury.

RUBBER WORLD extends its heartiest congratulations to Mr. Banbury in connection with this recognition of his achievements.

Details of this award and the rest of the meeting program will be covered in our next issue.

ASTM D-13 Meets On Textiles, Tire Cords

Committee D-13 on Textile Materials of the American Society for Testing Materials held its autumn conclave on October 13-16 at the Sheraton-Atlantic Hotel, New York, N. Y. Of special interest were the activities of subcommittee A-9, which is charged with trying to revise and expand tire cord testing procedures. Past meetings have been held between members of D-13 (textiles) and D-11 (rubbers) of ASTM to determine the jurisdiction of each committee in such testing. Agreement was reached that D-13 would evolve the required new tests on dipped or rubberized cords and that D-11 would be responsible for developing standard methods for adhesion of the cords to rubber.

Tire Cords

A report of the task group of subcommittee A-9 on new tests was given at this meeting by the group's chairman, F. J. Kovac, of The Goodyear Tire & Rubber Co. Made available at this time were reprints of ASTM Designation: D 885-59T, a revised standard which had been approved by letter-ballot since the last meeting. This new standard will appear in the forthcoming annual edition of ASTM Standards on Textile Material. As a revision, the new standard includes many new tolerances and methods of testing than had the previous standard (D 885-58T).

New tolerances added to the revised standard include Linear Density (Yarn Number), Cord Modulus, Growth, Heat Shrinkage, Heat Shrinkage Force, Wet Contraction, Wet Contractile Force, and Dip Pickup. Revised or new methods of testing added to the standard include General Methods, Sampling Cord on Cones, Bobbins or Spools, Sampling Woven Cord Fabrics, Test Conditions, Fabric Weight, Thickness, Linear Density, Breaking Strength of Conditioned Cords, Moisture Regain, Actual. Also included are Adjustment of Observed Breaking Strength to an Optimum Regain Basis, Breaking Tenacity of Conditioned Cords, Adjustment of Observed Elongation to an Optimum Regain Basis, Breaking Strength of Oven-Dry Rayon Cords, Breaking Tenacity of Oven-Dry Rayon Cords, Elongation of Oven-Dry Rayon Cords, Twist, Hot Strength, Cord Modulus, Growth, Heat Shrinkage, Heat Shrinkage Force, Wet Contraction, Wet Contractile Force, and Fatigue Resistance.

Kovac also appointed three new task groups to carry out further clarification on test methods. The first group will deal with atmospheric conditions and moisture regain as they apply to D 885-59T. The second group, under the direction of G. Harrison, E. I. du Pont de Nemours & Co., Inc., will continue work on dip pickup. The third group will be a clarification group headed by Kovac which will review, in general, test methods and comment on letter-ballots.

At the meeting of Subcommittee A-9, Mr. Harrison reported on some adhesion studies done by D-11 which covered the adhesion of cord to rubber. This work, done in liaison with A-9, involved the laboratory testing of five different adhesion test methods.

Chafer Fabrics

A report of the task group on chafer fabrics given by Group Chairman M. C. Bullock, of The B. F. Goodrich Co., indicated that an active task group is reviewing the standard (D 122-37) at this time. This standard covers tests of chafer fabrics from all the fibers and includes such new, yet already widely used tests as air wicking and dip pickup.

Fabric Test Methods

Chairman of subcommittee B-9 on Fabric Test Methods, N. J. Abbott, Fabric Research Laboratories, Inc., reported that its task group, which has considered revising D 181 (Standard Specifications and Methods of Test for Certain Heavy Cotton Fabrics for Manufacture of Hose and Belting), decided that no changes are contemplated in this standard at the present time.

Plastic Truck Cabs Topic at DRPG Meeting

At the October 2 meeting of the Detroit Rubber & Plastics Group, Inc., members and guests were treated to an up-to-date report on White Motor Co.'s plastic truck cab. Featured at the predinner technical session were Bert C. Harris, of White Motor, and J. R. Hammond, of Molded Fiber Glass Body Co.

Mr. Harris described the advantage of plastic truck cabs to truckers. A chief advantage is a substantial reduction in weight. For example, a molded fiber-glass panel 0.100-inch thick weighs approximately 60% as much as an equivalent piece made of 20-gage steel. This saving in weight allows more payload to be carried and results in improved vehicle performance. Both of these, of course, are important factors to the trucking industry.

The reinforced plastic parts are also completely impervious to rust and corrosion. The elimination of rust and corrosion cuts maintenance expense and results in more attractive appearance throughout the life of the vehicle.

Other advantages include lower noise level in the plastic truck cab and easier repair of damaged parts by relatively inexperienced personnel with a minimum of equipment. White Motor has also found that the plastic cab can be produced with much lower tooling cost than a comparable sheet-metal cab. The total cost of tooling to produce the cab-over-engine tilt cab is less than one-sixth of the cost to tool the same design in metal.

Mr. Hammond described in some detail the manufacturing methods employed in producing and assembling the cab for White Motor. He pointed out that each of the 36 parts employed in the plastic cab is molded in matched metal dies in a hydraulic press. The matched metal die method was chosen for several reasons: (1) to obtain the highest and most consistent physical properties, (2) to maintain the closest control over material thickness, (3) to obtain a smooth surface on both sides of the part, (4) to obtain the highest possible production rates and (5) the lowest cost.

He pointed out that the 36 molded parts being produced for the White truck cab vary from relatively small windshield division bars to the complete roof panel and underbody. The underbody of the cab, for example, is molded in one deep piece measuring 96 inches wide, 50 inches long, and 30 inches deep. Other components of the assembly would be difficult or impossible to duplicate in sheet metal. In fact, the freedom of design possible when using fiber-glass reinforced plastics is one of its key features.

Following dinner the Group was treated to an inside look at Ford Motor Co.'s Levacar project. This is Ford's name for its wheelless vehicle development. Speaker on this topic was David J. Jay, principal research engineer in Ford's Levacar project. Mr. Jay showed a new color movie demonstrating the principles involved in this "air pad" method of transportation. Also included were action photographs of the Levascooter and the first one-passenger Levacar to be produced by Ford.

The Ford concept of levitation by air was designed for high-speed public transportation rather than for relatively low-speed private transportation over all types of surfaces. The company visualizes to travel in the 200- to 500-mile-per-hour range on minimum trips of approximately 100 miles. The Levacar would combine the speed of air travel with the downtown-to-downtown convenience and substantial independence of weather generally associated with railroads.

Advantages of Levacar transportation include: (1) increased speed on the ground, (2) reduced power requirement as the Levacar is essentially frictionless, (3) use of conventional propulsion methods, (4) more economical road construction, since Levacar track can be laid more cheaply than a lane of concrete, (5) convenient depot locations, and (6) substantial independence of weather.

Past Presidents, Good Honored by NCRG

It was Past Presidents Night at the October 8 meeting of the Northern California Rubber Group held at the Berkeley Elk's Club, Berkeley, Calif. Another special feature of the meeting was the awarding of an achievement trophy to William D. (Don) Good, a founder and past president of the Group who has had 50 years of service with the rubber industry. Speaker for the evening was Dr. Harry Coderre, industrial psychologist, Rohrer, Hibler, & Replogle, who spoke on "Organization and the Man."

Past presidents who were guests of honor at the affair included Russ Kettering, and Ralph Hickcox, both of Oliver Tire & Rubber Co., Oakland; George Farwell, Goodyear Rubber Co., San Francisco; Ross Morris and Jos. Hollister, both of Mare Island Naval Shipyard, San Francisco; Don Good, American Rubber Mfg. Co., Oakland; Fred Swain, R. D. Abbott Co., Oakland; Jim Stull, retired; Halsey Burke, Burke Rubber Co., San Jose; and Bill Deis, Merck & Co., San Francisco.

The award to Don Good commemorated his 50 years of active service in the rubber industry. The presentation was made by Group President Drace Kutnewsky, Burke Rubber Co., and consisted of a trophy which was a pen, clock, and gold gavel on a white onyx base and bore the inscription "W. D. Good—Honoring 50 Years Valuable Service to Rubber Technology—1909-1959 — Northern California Rubber Group." Mr. Good began his career

Don Good *(standing)* was honored for 50 years' service to the industry. With him are *(left to right)* Joe Hollister and Russ Kettering

with The B. F. Goodrich Co. in Akron, O. In 1921 he formed his own company, The Good Rubber Co., Akron, which he operated until 1931. The years 1933 to 1935 were spent in England with the Commercial Rubber Products Corp. He is now chief chemist and factory manager of American Rubber Mfg. Co.

The speaker, Dr. Coderre, stressed individuality and creativity among members of management, rather than conformity. He said that a survey of company presidents had determined that most presidents do not wish conformity to be official policy, but the speaker noted that salary ranges, starting salaries high in respect to management salary gains, and the emphasis on

At Buffalo meeting: *(left to right)* C. E. Carlson, Robert Cowen, Richard Herdlein

the need to adapt, to get along at all costs, among other reasons had actually encouraged conformity.

Some of the things which can be done to eliminate conformity, according to the speaker, are to keep organization simple, think in terms of freedom to operate, review personnel regularly, encourage new ideas, tie responsibility to individual rather than group, and never divorce the development of people from supervision. He concluded that by using these means conformity could be combatted without resorting to worshipping non-conformity just for its own sake.

Past presidents honored by Northern California Rubber Group were *(seated, left to right)* Don Good, Ross Morris, George Farwell, Russ Kettering; *(standing, left to right)* Bill Deis, Ralph Hickcox, Halsey Burke, Jim Stull, Joe Hollister, and Fred Swain

Buffalo Fall Meeting

The Buffalo Rubber Group held its fall meeting at the Westbrook Hotel, Buffalo, N. Y., on October 13. Robert Cowen, vice president of U. S. Rubber Reclaiming Co., Inc., introduced Carl E. Carlson, manager of factory technical service and technical standards at The General Tire & Rubber Co., Akron, O., who spoke during the technical session on technical service problems.

Mr. Carlson stated that in any item of manufacture, variations existed in men, machinery, and materials, and it was the function of the technical service group to reduce the variations to a livable minimum, and to adjust and correct conditions which reflect unfavorably on quality and production efficiency. The speaker then discussed the organization and functions of the technical service group, and described how some typical problems were handled.

Following dinner, Richard Herdlein, of Hewitt-Robins, Inc., and chairman of the Buffalo Rubber Group, introduced Thomas F. Schifferli, design draftsman at Republic Steel Corp., who presented an interesting talk on the planning and progress of the federal highway program. A lively question-and-answer period followed, which included discussions of automatic vehicle guidance system and the progress in development of rubber roads.

Raymond Firestone *(left)*, president of The Firestone Tire & Rubber Co., introduced Paul Endacott *(center)*, president of Phillips Petroleum Co., guest speaker at the twelfth annual banquet of the Akron Council of Engineering & Scientific Societies (ACESS) held at the Sheraton-Mayflower Hotel, Akron, O., October 6. Endacott congratulates Dr. Raymond P. Dinsmore *(right)*, vice president of The Goodyear Tire & Rubber Co., who was awarded the Distinguished Award of Council for outstanding work in his profession and service to the community. Endacott, as guest speaker, reviewed the parallel histories of the petroleum and rubber industries and discussed the common problems of both. He stressed the very competitive nature of both industries and how research and development have been the important tools in the continuing progress of both.

Dr. Dinsmore receives the Award from the chairman, Civic Activities of ACESS, T. H. Rogers, of The Goodyear Tire & Rubber Co. ACESS is composed of the local sections of the American Chemical Society, seven professional engineer societies, and the American Institute of Architects. The banquet committee consisted of the chairman, L. G. Turk, National Machinery Co.; R. P. Whipple, The Firestone Tire & Rubber Co.; R. B. Sucher, Witco Chemical Co.; Richard Sawdey, The Firestone Tire & Rubber Co.; and S. Mihelick, The Goodyear Tire & Rubber Co. L. E. Bunts, president of ACESS, and an Akron City engineer, was master of ceremonies.

New Elastomers For High Temperatures

The fall meeting of the Boston Rubber Group was held October 16 at the Hotel Somerset, Boston, Mass., with about 285 members and guests present. The afternoon technical session consisted of three speakers discussing new elastomers. D. A. Stivers, Minnesota Mining & Mfg. Co., St. Paul, Minn., gave a talk on "Recent Developments in Fluorel Compounding." T. D. Eubank, E. I. du Pont de Nemours & Co., Inc. Wilmington, Del., discussed "New Developments in 'Viton' ('Viton' B)." The third speaker was Juan C. Montermoso, Quartermaster Research & Engineering Center, Natick, Mass., who

Fay Foto Service, Inc.

Speakers at the Boston Rubber Group meeting were: (*left to right*) D. A. Stivers, J. C. Montermoso, and T. D. Eubank

spoke on "Current Approaches to Elastomer Research."

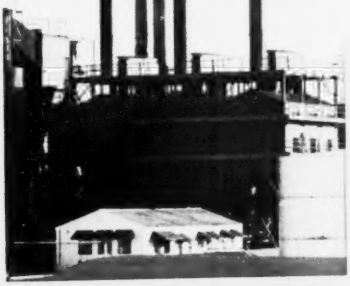
Technical Program

The talk by Mr. Stivers covered the development of the fluoroelastomers which provide fluid resistance, heat resistance, compression set at high temperatures, and low-temperature flexibility combined in one material. He presented comparisons of practically all of the currently available elastomers of this type along with several typical Fluorel compounds which were designed for specific properties and applications. The speaker used certain military specifications as examples and showed how the compounds could be varied. Differences in the compounds were obtained mainly by varying the amount of the accelerator-curative, HMDA carbamate. Aging data were presented at 600 to 650° F., showing rate of loss in properties with temperature increase and relating these losses to increasing amounts of curative.

The "Viton" presentation by Mr. Eubank expanded on the recent Du Pont announcement on the newest member of the family, "Viton" B. In comparisons with "Viton" A, this new B version showed improved fluid service properties and somewhat higher viscosity, but requires about 50% more curing agent. The cured hardness of the compound is also higher, but losses after aging are reduced. Elongation and tensile after aging are better for the B polymer than the A after two days' aging at 600° F.

Data were presented showing this new elastomer with various curing agents in compounds to meet certain specifications. In general, these B polymer stocks swell less than A in fluid aging. Best performance in acids and alkalies was obtained by using a litharge cure. The "Viton" B also was shown to be improved regarding tear resistance and low-temperature brittleness, but "Viton" A is better in low-temperature flexibility.

Studies are being made by the Quartermaster Corps to find materials suitable for astronautical uses, according to Dr. Montermoso. Service requirements have been raised to accommodate the 500° F. temperature of structural



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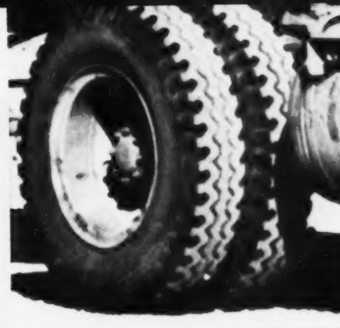

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plane parts expected during reentry as well as over 2000° F. for leading edges. Specifications are expected to require materials that can withstand 500° F. for 1,000 hours, and 1000° F. for 80 to 100 hours.

Along with these futuristic requirements, the Corps is looking for materials capable of withstanding heat and nuclear radiation for short periods, even as low as three seconds, but at high temperature. These would be used for flame-retardant clothing and similar uses. Since the upper limit for organic materials seems to be about 700° F., the newer studies have been using inorganic and organo-metallic materials. Since most of the work in these studies had not been cleared for publication, it was not possible to go into too great detail.

Dinner Program

After the technical session the Group held the usual cocktail hour and dinner. Speaker for the after-dinner session was Miss Priscilla Hiers, who gave a lecture on "Sea Sights and Sails around the World."

Polymers for '60's

The Connecticut Rubber Group has announced plans for a winter meeting on February 19, 1960, at Waverly Inn, Chesire, Conn., featuring a symposium on "Polymers for the '60's." The panel, moderated by E. R. Bridgwater, E. I. du Pont de Nemours & Co., Inc., will consist of R. P. Dinsmore, Goodyear Tire & Rubber Co., on tires; H. A. Winkelmann, Sheller Mfg. Co., on mechanical goods; J. T. Blake, Simplex Wire & Cable Co., on wire and cable; and L. Tallalay, B. F. Goodrich Sponge Products Co., on cellular products. Also on the program will be a lecture on polymers by H. F. Mark, Polytechnic Institute of Brooklyn.

Plasticizers Theme of VIPAC, SPE, Meeting

The New York Section of the Society of Plastics Engineers, Inc., held its second meeting of the year at the Governor Clinton Hotel, New York, N. Y., on October 21. The Vinyl Professional Activities Committee (VIPAC) presented Part II of its two-part symposium, "The Effect of Plasticizers in Processing Vinyls." This forum was moderated by Roy Kern, Thompson Chemical Co., and featured two guest speakers. The talks are summarized below.

Philip G. Whitney, B. F. Goodrich Chemical Co., spoke on "The Effect of Plasticizers on the Processing of Plastisols." He stated that the plasticizers used to make a plastisol will contribute not only to the physical properties of the finished product, but also to the ease with which the plastisol is mixed and deaerated, and the length of time that it can be stored. These factors are related to viscosity and viscosity-temperature characteristics of the plastisol. He then gave descriptions of the various factors that influence plastisol mixing and the test procedures used to measure these factors.

The second VIPAC paper, "The Effects of Secondary Plasticizers on Processing Vinyl Resins," was presented by Paul D. Sharpe, Socony Mobile Oil Co. Mr. Sharpe discussed the part played by hydrocarbon secondary plasticizers in vinyl resins, their advantages and limitations. Cost is the biggest factor on the use of secondary plasticizers, and savings of 2-3¢ on a pound volume basis is not uncommon with such materials. Quality sacrifice can be kept at a minimum by the proper use of secondary plasticizers.

At the general meeting of the section, "Applications of Polypropylene," was a paper presented by William Claypoole, Spencer Chemical Co., the abstract of which was not available at the time that we went to press. Also, Dr. Williams Wachs, management consultant, addressed the general meeting on the topic, "Who Tells What to Whom—and How."

CALENDAR of COMING EVENTS

November 29-December 4
American Society of Mechanical Engineers. Annual Meeting. Chalfonte-Haddon Hall, Atlantic City, N. J.

December 1
SPE Washington-Baltimore Section. Regional Technical Conference on "Stability of Plastics." Auditorium, National Academy of Science, Washington, D. C.

December 1-3
Eighth Annual Wire & Cable Symposium. Berkeley-Carteret Hotel, Asbury Park, N. J.

December 3
Fort Wayne Rubber & Plastics Group. Van Orman Hotel, Fort Wayne, Ind.

December 3-5
American Chemical Society. Southwest Regional Meeting. Capitol House, Baton Rouge, La.

December 7-10
National Conference on Application of Electrical Insulation. Shoreham Hotel, Washington, D.C.

December 8
Buffalo Rubber Group. Christmas Party. Buffalo Trap & Field Club, Buffalo, N. Y.

December 11
Detroit Rubber & Plastics Group. Christmas Party. Hotel Statler, Detroit, Mich.
Boston Rubber Group. Christmas Party. Hotel Somerset, Boston, Mass.

December 12
Southern Ohio Rubber Group. Christmas Party. Miami Valley Country Club, Dayton, O.

December 18
New York Rubber Group. Christmas Party. Henry Hudson Hotel, New York, N. Y.
Chicago Rubber Group. Christmas Party. Morrison Hotel, Chicago, Ill.

January 25-28
Plant Maintenance & Engineering Show. Convention Hall, Philadelphia.

January 29
Akron Rubber Group. Sheraton Hotel, Akron, O.
Chicago Rubber Group. Furniture Club, Chicago, Ill.

February 1-5
American Society for Testing Materials. Committee Week. Hotel Sherman, Chicago, Ill.

February 2
The Los Angeles Rubber Group, Inc. Biltmore Hotel, Los Angeles, Calif.

February 3-5
Committee D-11, ASTM. Hotel Sherman, Chicago, Ill.

February 5-7
Boston Rubber Group. Ski Week-End.

February 11
Fort Wayne Rubber & Plastics Group.

February 12-13
Southern Rubber Group, Shamrock Hilton, Houston, Tex.

February 19
Connecticut Rubber Group. Symposium: "Polymers for the '60's." Waverly Inn, Cheshire, Conn.

March 1
The Los Angeles Rubber Group, Inc. Biltmore Hotel, Los Angeles, Calif.

March 11
Chicago Rubber Group. Furniture Club, Chicago, Ill.

March 18
Boston Rubber Group. Hotel Somerset, Boston, Mass.

WASHINGTON REPORT

By JOHN F. KING

Justice Reports Few Changes In Synthetic Rubber Picture

The 1957-58 recession and a continuation of a buyers' market in synthetic rubber made it difficult for the Justice Department to get a clear picture of the growth of industry competition last year. Even so, the Department's fourth annual report on competitive developments since the government sold the war-built plants to private companies in 1955 constitutes another clean bill of health for the synthetic rubber industry.

Major 1958 Trends

Attorney General William P. Rogers concluded that he is satisfied with the way the smaller companies, particularly in the general-purpose synthetic rubber industry, "evidenced real competitive strength" in 1958, although from an over-all point of view he said "the industry presented a rather static picture, with no startling changes from 1957." Rogers expressed particular satisfaction with the development of more widespread competition on the West Coast, where Shell Chemical Corp. has been the only producer, and with the "proliferation" of new synthetic rubber grades last year. A third encouraging factor, he said, was what appeared to be in 1958 the "breakdown" of company specialization in some fields.

The Attorney General's report to Congress—one of ten annual surveys he must make under the terms of the 1953 Plant Disposal Act—pointed out, however, that the recession year of 1958 was one of transition, "and it will take at least another year's operations to ascertain whether these tendencies are merely isolated phenomena or reliable indicators of more widespread competition." While small synthetic fabricators had no complaints about supplies, price and terms, there is no indication of how they will fare, dependent as they are on the major producers, "should rubber demand overtake or surpass productive capacity of the industry."

While Rogers preoccupied himself with the pattern of competition in SBR and special-purpose synthetics, as well as their feedstocks, he devoted much of the 57-page report to an analysis of developments in the foreign field. The kernel of his findings here was that the American synthetic rubber industry faces the same fate, in the years immediately ahead, that has befallen the American automobile industry.

United States producers of synthetic rubber, he predicted, can look for a gradual shrinkage of their export markets—although the decline to 194,000 tons in overseas shipments last year was not so sharp as he had forecast in his third annual report in July of 1958. On top of this, Rogers said, foreign production now rapidly coming on stream "eventually may affect the domestic market."

The report omitted last year's criticism of rigidities in the basic price structure of the synthetic rubber industry. In his third report on competitive developments in 1957, Rogers was impatient with the "almost complete lack of price competition" among producers of synthetics and their component raw materials. It was apparent in the current review that the slack business conditions which prevailed through most of 1958 tempered the Justice Department's disapproval of the producers' pricing policies.

In discussing the pattern of competition among producers of general-purpose synthetic, Rogers said "the trend toward concentration of the market among the three largest companies seems to have stopped . . ." He called this 1958 development "a possible indication of the competitive strength of the smaller companies in a time of adverse business conditions."

Fourth-Report Highlights

Exports

The export market in the future is certain to be affected by the entry of a number of foreign producers, both independents as well as licensees or affiliates of American rubber companies, Rogers declared. He listed existing and planned synthetic rubber expansion in Great Britain, Italy, West Germany, France, Holland, Japan, Australia, Brazil, Argentina, Canada, and even Communist Czechoslovakia to make the point that the industrial world's demand for synthetic rubber, produced in the market in which it is to be fabricated, is bound to cut into U. S. sales abroad. He pointed to the plans of the Italian company, ANIC, to sell its SBR in this country once it is in full production. Imports of synthetics in the past have come only from Canada's Polymer Corp., Ltd.

Research and Development

In research and development, the Attorney General stated such efforts of the American synthetic rubber producers "continued to play an important part in industry activity during 1958 and early 1959." He said the most important development in this field was Shell's inauguration of commercial production of polyisoprene rubber, a synthetic polymer that would be an almost "complete duplicate" of natural rubber.

Noting the plans of a number of companies to begin production of polyisoprene and other competitors of natural such as polybutadiene, Rogers said they would be an "important aid to national defense. Their availability in sufficient quantity will free the U. S. completely from dependence on foreign sources of natural rubber in time of emergency." He added that in the commercial world, "Its presence on the market should have a stabilizing effect on the traditionally fluctuating natural rubber prices."

Expansion

In his general comments on the overall competitive pattern of the industry last year, the Attorney General, noting that only one company—Odessa Styrene Co.—entered the industry in 1958, called attention to what he said was the "overexpanded" condition in synthetic rubber capacity. He said it is "doubtful" if competition may be anticipated from any additional domestic producers in the foreseeable future.

TABLE 1. S-TYPE RUBBER CAPACITY,* BY COMPANY, 1955, 1957-59

[Thousands of long tons]

Company†	May 1, 1955	Dec. 31, 1957	Dec. 31, 1958	Anticipated Capacity, Dec. 31, 1959
Goodyear (1)	146.5	255.6	255.6	255.6
Firestone (3)	129.6	‡231.1	231.5	231.5
Goodrich-Gulf (2)	95.0	232.0	247.0	274.0
Shell (5)	94.0	126.0	126.0	126.0
Texas-U.S. (4)	88.0	127.0	127.0	127.0
Phillips (6)	69.4	111.0	118.0	118.0
United Rubber (8)	§62.0	69.8	69.8	69.8
Copolymer (7)	49.0	75.0	75.0	95.0
A.S.R.C. (9)	44.0	68.5	68.5	68.5
United States Rubber (11)	22.2	30.0	30.0	32.0
General (10)	....	40.0	40.0	40.0
All other¶	....	‡5.3	7.7	16.6
Total	799.7	‡1,371.3	1,396.1	1,454.0

* Productive capacity, including the weight of oil and carbon black, and assuming the "Normal Pattern of Production" experienced by the company.
† Companies are listed in order of relative size at the time plants were transferred to private ownership. Figure listed after company name identifies the rank in order of 1958 S-type capacity.
‡ Revised.
§ Capacity on July 15, 1955, when plant was transferred to United Rubber & Chemical Co.
¶ Includes Dewey & Almy Chemical Division, W. R. Grace & Co., and International Latex Corp. The Dewey & Almy capacity here included is attributed wholly to S-type rubber. In fact, part of this capacity may be normally devoted to manufacture of other products. When the facilities are so used, the productive capacity can vary significantly.
Source: 1955 and 1957 data from *Third Report*, p. 10; 1958 and 1959 data based on information furnished to the Department by the producers.

Demand, he forecast, is not likely to catch up with overall capacity "for several years."

While the government had anticipated last year that 1958 expansion of SBR productive capacity would total 68,000 tons, the recession caused a cutback to only 25,000 tons. Rogers estimated that 1959 capacity would be expanded from the 1,396,100-ton total as of December 31, 1958, by 58,000 tons to 1,454,000 tons by the end of this year. Featuring the new round of SBR expansion will be the emergence of Goodrich-Gulf Chemicals, Inc., as the top company in this category, increasing its 1958 capacity from 231,500 tons—second to Goodyear Tire & Rubber Co.'s 255,600-ton capacity—to 274,000 tons by the end of 1959.

SBR Production and Sales

Goodyear continued in 1958 to hold the lion's share of SBR production and sales by a wide margin. But the report noted the Goodyear margins in both categories declined slightly in line with the general shrinkage of about 3% in the collective share of the three largest companies—Goodyear, Firestone Tire & Rubber Co., and Goodrich-Gulf. Making "respectable advances" at the expense of the Big Three in production and sales were Texas-U. S. Chemical Co., and the newcomer in SBR production, General Tire & Rubber Co. As noted above, the "invasion" of the West Coast market, heretofore the exclusive preserve of Shell Chemical, cut down on that company's dominant position in the area, and "most of the smaller producers strengthened their sales positions slightly." (See Tables 1 and 2.)

Although cold rubber continued to be the dominant category of SBR produced in this country last year, there were "significant changes" in the relative production figures for its component types, according to Rogers. Cold oil masterbatch increased slightly, and oil-black masterbatch increased greatly. In percentage of total SBR, cold oil masterbatch is rapidly overtaking the standard cold rubber in comparative production (31.0 in 1957 *vs.* 40.4% in 1958.) The introduction of new techniques of adding carbon black to synthetic rubber should accelerate the trend toward increased oil-black production. (See Table 3.)

The breakdown in plant specialization—a development that promises more widespread competition—was most prominent in the entry of new producers into one or more new types of production during 1958. The report noted that only Phillips Chemical Corp. and Shell

TABLE 3. PRODUCTION OF S-TYPE RUBBER, BY TYPE, 1955, 1957-58

Type	May-December, 1955 Long Tons*	May-December, 1955 % of Total	1957 Long Tons*	1957 % of Total	1958 Long Tons*	1958 % of Total
Regular S-type	139,735	27.4	158,949	19.4	143,453	18.5
Cold S-type	211,092	41.4	364,593	44.4	312,587	40.4
Oil masterbatch	115,172	22.6	539,965	29.2	†240,424	31.0
Black masterbatch	16,201	3.2	18,257	2.2	43,526	5.6
Cold and regular black masterbatch	27,670	5.4	39,132	4.8	35,088	4.5
Total	509,870	100.0	820,896	100.0	775,078	100.0

* Does not include oil and carbon black content.
† Includes regular oil masterbatch.
Source: 1955 and 1957: U. S. Department of Commerce, *United States Rubber Statistics*, Feb 1956 and Feb. 1958. 1958: *Rubber Facts for Industry*, p. 4.

TABLE 2. MARKET POSITION OF S-TYPE RUBBER PRODUCERS, 1955, 1957-58

Company*	Percentage of Capacity: May 1, 1955	Dec. 31, 1957†	Dec. 31, 1958	Percentage of Production: May-December, 1955	1957	1958	Percentage of Domestic Sales‡: May-December, 1955	1957	1958
Goodyear (1)	18.3	18.6	18.3	17.7	24.2	24.1	23.0	23.1	22.2
Firestone (3)	16.2	16.8	16.5	19.1	20.6	19.4	19.9	19.1	18.3
Goodrich-Gulf (2)	11.9	16.9	17.7	12.7	13.9	12.2	10.3	12.1	11.2
Shell (5)	11.7	9.2	9.0	10.2	7.7	6.3	10.6	8.5	6.9
Texas-U.S. (4)	11.0	9.3	9.1	12.0	7.0	9.2	10.4	9.2	10.3
Phillips (6)	8.7	8.1	8.5	7.1	8.3	8.1	8.0	8.3	7.0
United Rubber (8)	§7.8	5.1	5.0	3.7	4.4	4.2	5.0	6.2	6.7
Copolymer (7)	6.1	5.5	5.4	6.4	7.1	6.6	5.6	7.2	7.9
A.S.R.C. (9)	5.5	5.0	4.9	6.6	4.0	4.4	5.3	3.7	4.6
U.S. Rubber (11)	2.8	2.2	2.1	2.6	2.4	2.2	1.9	2.5	2.3
General (10)	...	2.9	2.9	....	.3	3.1	...	.1	2.4
All others¶	...	.4	.6	**1.9	.1	.2	...	††	.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

* Companies are listed in order of relative size at the time plants were transferred to private ownership. Figure listed after company name identifies the rank in order of 1958 S-type capacity.
† Revised.
‡ Includes intracompany transfers and sales to affiliates. Excludes domestic resale of purchased rubber.
§ Capacity on July 15, 1955, when Baytown plant was transferred to United Rubber & Chemical Co.
¶ Includes Dewey & Almy Chemical Division, W. R. Grace & Co., and International Latex Corp.
** Government production at Baytown, Tex., plant, May 1 to July 15, 1955.
†† Less than 0.1 of 1%.
Source: 1955 and 1957 data from *Third Report*, p. 11; 1958 data based on information furnished to the Department by the producers.

Table 4. Distribution of Cold Oil-Black Masterbatch Rubber Rroduction, by Company, 1955, 1957-58

Company*	May-December, 1955 %	May-December, 1955 % of Total S-Type Production	1957 %	1957 % of Total S-Type Production	1958 %	1958 % of Total S-Type Production
United Rubber (8)	†77.3	†2.5	70.9	1.5	‡41.1	‡2.3
Phillips (6)	13.6	.4	21.8	.5	12.1	.7
Shell (5)	9.1	.3	7.3	.2	10.9	.6
Copolymer (7)	...	...	...	...	18.7	1.1
Texas-U.S. (4)	...	...	...	...	8.4	.5
Firestone (3)	...	...	...	...	4.4	.2
Goodyear (1)	...	...	...	...	2.6	.1
Goodrich-Gulf (2)	...	...	...	...	1.6	.1
General (10)	...	...	...	...	.2	§
Total	100.0	¶3.2	100.0	¶2.2	100.0	¶5.6

* Companies are listed in order of cold oil-black masterbatch rubber production (1955) after transfer of plants to private ownership. Figure listed after company name identifies the rank in order of total 1958 S-type capacity.
† Includes government production at Baytown, Tex., plant, May 1 to July 15, 1955, prior to transfer to United Rubber & Chemical Co.
‡ Operations of this company were temporarily disrupted by a plant explosion early in 1958.
§ Less than 0.1 of 1%.
¶ Percentage of total S-type production listed in Table 3.
Source: 1955 and 1957 data from *Third Report*, at 16; 1958 data based on information furnished to the Department by the producers.

had produced a complete range of SBR types in 1957 and pointed out that by last year, Goodyear, Goodrich-Gulf, Texas-U. S., and General had joined them. Others, such as Firestone, started production of some of the five major types of SBR. The category "most strikingly affected," the report said, was cold oil-black masterbatch, now produced by all the major companies except United States Rubber Co. and American Synthetic Rubber Corp., but which in 1957 was produced only by United Rubber & Chemical Corp., Shell, and Phillips.

Although production in cold oil-black masterbatch accounted for only 5.6% of all SBR produced domestically last year, this still is double the 1957 total. The reports said that the entry of six new producers into production of this type assures a continuing rise through 1959 that "should promote overall industry competition, inasmuch as the current leaders are not those most prominent in other fields of production." (See Table 4.)

At the same time, the report noted the continued decline of carbon black masterbatch, which last year accounted for 4.5% of SBR production. With seven producers now active in producing this type, "there can be anticipated in 1959 both sharpened competition . . . and an upswing in its comparative production."

Sales last year were marked by an increase in "captive" or intracompany transfers because of the soft market created by the recession, the report explained. Captive sales rose from 53% of all domestic sales in 1957 to 56.7%, although independent fabricators retained the same share of SBR sales as they held in 1957, it added. The industry's sales picture last year also was marked by a sharp decline in the use of long-term sales contracts, reflecting in part the unwillingness of purchasers to commit themselves in a period of oversupply.

A bright spot from Rogers' point of view was the West Coast sales record. Shell, which handled 80-90% of all West Coast sales since the industry bought the plants four years ago, lost out heavily to other major producers which began marketing west of the Rockies last year. Shell's share of the local market dropped 22% from 81.7% in 1957 to 59.5% in 1958. This performance, Rogers said, does not appear to be an "isolated phenomenon, but the beginning of long-term efforts by other majors to penetrate this market." (See Table 5.)

Table 5. Distribution of West Coast Sales of S-Type Rubber, by Company, 1957-58

Company*	% of Total Sales on the West Coast 1957	% of Total Sales on the West Coast 1958	% West Coast Sales of Company's Total Domestic Sales† 1957	% West Coast Sales of Company's Total Domestic Sales† 1958
Shell (5)	81.7	59.5	69.2	79.7
Goodyear (1)	‡	13.4	‡	5.6
Firestone (3)	4.5	11.5	1.7	5.8
Goodrich-Gulf (2)	11.9	9.8	7.0	8.1
Texas-U.S. (4)	.5	1.8	.4	1.6
General (10)	.3	1.6	6.3	6.1
United Rubber (8)	.1	1.0	.1	1.4
Phillips (6)	.6	.5	.6	.7
A.S.R.C. (9)	.3	.5	.5	1.0
Copolymer (7)	‡	.3	‡	.4
U.S. Rubber (11)	.3	.1	.8	.6
Total, all companies	100.0	100.0	7.2	9.3

* Companies are listed in order of West Coast sales volume in 1958. Figure listed after company name identifies the rank in order of total 1958 S-type capacity.
† Includes intracompany transfers, where applicable.
‡ Less than 0.1 of 1%.
Source: 1957 data from Third Report, p. 21; 1958 data based on information furnished to the Department by the producers.

The drop in export sales from slightly over 200,000 tons of dry synthetic rubbers in 1957 to 193,917 tons last year denotes the continued development of a foreign synthetics industry "increasingly capable of supplying its own needs," the report explained. It noted that even in a declining market, the smaller producers were able to increase their respective shares of export sales. (See Table 6.)

SBR Feedstocks

Discussing the SBR feedstock situation last year, Rogers reported that butadiene showed the most effects from the recession. A "real market for butadiene outside the synthetic rubber industry has not yet been developed," he said, which in large part is responsible for lacklustre developments in the overexpanded butadiene field. Overall capacity was expanded through the enlargement of Firestone's Orange, Tex., plant, and "as business became better later in 1958, five companies planned 1959 capacity increases totaling some 100,000 tons" of butadiene. Goodrich-Gulf and Texas-U. S., by planned expansions, "will thus jointly replace Phillips as second in size to the industry leader, Petro-Tex Chemical.

Because styrene is not the captive of the synthetic rubber industry that butadiene is, this feedstock enjoyed a "considerable market" for its numerous chemical uses in 1958. Chief among these last year was a booming export

Table 6. Distribution of Export Sales of S-Type Rubber, by Company, 1958 (in Percentage)

Company*	Total Export Sales	Sales to Subsidiaries and/or Affiliates	Sales to All Other Foreign Customers
Goodyear (1)	29.6	18.5	11.1
Firestone (3)	18.0	14.3	3.7
Phillips (6)	16.3	...	16.3
Goodrich-Gulf (2)	14.2	...	14.2
General (10)	5.9	4.9	1.0
Shell (5)	4.7	...	4.7
Texas-U.S. (4)	4.1	...	4.1
United Rubber (8)	3.5	...	3.5
A.S.R.C. (9)	1.9	.5	1.4
Copolymer (7)	.9	...	.9
U.S. Rubber (11)	.9	.5	.4
Total	100.0	38.7	61.3

* Companies are listed in order of export sales volume. Figure listed after company name identifies the rank in order of total 1958 S-type capacity.
Source: Data based on information furnished to the Department by the producers.

market, with the overwhelming majority of foreign shipments slated for uses "other than synthetic rubber manufacture," the report stated. It noted that two of the major American producers —Dow Chemical Co. and Koppers Co. —are building styrene facilities in Australia and Argentina, respectively.

Specialty Synthetic Rubbers

Discussing the specialty synthetic rubbers, Rogers revealed the three major types—butyl, neoprene, and nitrile—slipped slightly from their 1957 share of 17% of total synthetic production, but suggested this decline resulted from cost-cutting by fabricators who switched to cheaper general-purpose synthetics.

Noting the development of Esso Standard Oil Co.'s all-butyl tire, the report said this product promises to make butyl a more important factor in the synthetic field. A bigger butyl market, which shrank in recent years with the advent of the tubeless tire, is a "prerequisite" to the entry of any new producers in the field, Rogers said. He did not disguise his disappointment with the failure of Petroleum Chemicals, Inc., to pursue its plans for a 30,000-ton-capacity butyl plant, leaving Esso Standard Oil Co. of N. J. and its affiliate Humble Oil in exclusive control of butyl production here.

Small Business

In his annual survey of 100 independent fabricators to determine how small business fared during the year —a duty imposed by Congress in 1953 —the Attorney General had a number of conclusions to report.

Unlike recent years when the government's main concern was to insure that small fabricators received a fair share of synthetics at fair prices, the problem in 1958 for synthetic manufacturers was one of "finding markets for their production rather than of allocating output among potential customers," Rogers explained. For the first time since the reports have been made, there were no complaints from small users either about supplies or prices, although "several fabricators noted the absence of price competition among the various producers," he added. There was a slight exception to this rule, he further stated, and that was the "position of Du Pont in neoprene which some fabricators believed had resulted in an unnecessarily high price."

But on the whole, he said the smaller firms were "well pleased" in 1958 with the "effective" rivalry of the producers for their business. Among the developments last year most welcome to the small firms, Rogers said, were (a) the production of new and better grades; (b) improvement of laboratory service and assistance; (c) improvement in packaging; and (d) a general improvement in the quality of existing SBR grades.

U. S. Stockpile Sales Begin; NRB Sees Possible 1960 Surplus

The government's plan for disposing of between 40,000 and 50,000 tons of stockpiled natural rubber by next June 30 has not caused a ripple in the world market since it became plain since summer that the sell-off would occur. A parallel move by Great Britain to sell off some of its rubber stockpile similarly had no effect on rubber prices.

Rubber prices in October remained, in the face of market-depressing stockpile sales, the highest that they have been in years.

Yet the announced moves to liquidate small fractions of the U. S. and British stockpiles had an impact on the marketing forecasts of the Natural Rubber Bureau, an organization backed by Southeast Asian rubber producers to promote the use of natural rubber in this country.

NRB Comment

The Bureau predicted early in October that the world supply deficit for natural rubber which has existed since 1956 would continue through 1960. For 1960, however, there is a big "if" attached to the Bureau's forecast. Estimating natural rubber production next year at about 2,000,000 tons, the Bureau said stockpile sales of 60,000 to 70,000 tons will "either lower 1960's estimated world stock deficit substantially or could even swing supply in excess of demand."

If supply next year is greater than demand, it would mark the first time this situation has arisen since 1956, the year of the Suez crisis. The supply shortfall that year was 15,000 tons. For 1959, the Bureau estimates the natural rubber supply deficit will have grown to 40,000 tons, even in the face of U. S. Governmnet stockpile sales which began October 16.

GSA Plans

Regarding the U. S. Government's fiscal 1960 rubber sales program, the General Services Administration, the government's sales agent, refuses to disclose specific selling plans. But informal talks with stockpile managers confirm that the 40,000- to 50,000-ton liquidation effort will be handled in three separate lots of 12,000-ton minimum quotas during each of the three remaining quarters of fiscal 1960—the last of '59 and the first two of '60.

If the minimum quarterly allotments turn out to be the maximum—and officials indicate this might very well happen since GSA must insure that world markets are not disturbed by the government sell-off—then only about 36,000 tons will be sold by June 30, 1960. GSA would look on this as adequate, however, since its old rotation schedule indicates only 40,000 tons, minimum, must be disposed of annually to prevent deterioration loss. Congress ordered GSA to scrap the rotation plan, in use since World War II, and to sell off the oldest rubber in stock without replacement.

The fiscal 1960 sales will be conducted on the basis of telephone and telegraph bid, beginning in mid-October, according to a GSA release dated October 2. Officials say they will be guided in how much in excess of the 12,000-ton quarterly minimum they will sell by keeping a close watch on the market. Apparently the only way the trade will know that sales for any given quarter are to be stopped is when GSA fails to respond on bids. Anyone wishing further information or to negotiate for the purchase of rotation rubber should contact J. J. Wolfersberger or J. P. McElligott at EXecutive 3-4900, Extension 4447, at the GSA in Washington, D. C.

FTC Complaint Answered; New Charges Filed

Fourteen rubber companies and two rubber industry trade associations have answered the Federal Trade Commission's blanket charges of illegal price-fixing on tires and tubes.[1] The industry's response to FTC's mid-June complaint was to deny the charges and ask that they be dismissed. The industry's separate answers to the charges, filed early in October with the trade-policing agency, will result in a hearing of the case by an FTC trial examiner before there is any further action on the complaint.

In its June 12 charges, FTC threw the book at the companies, The Rubber Manufacturers Association, Inc., and the Tire & Rim Association, with allegations that the companies and the associations conspired to fix tire and tube prices throughout the country.

FTC said that the companies and associations "adopted and maintained" a uniform price system for tires and tubes which allowed the Big Four producers — Goodyear, United States, Goodrich, and Firestone—to quote identical or "substantially matched" prices to all customers of a class, no matter where they were located in the nation. FTC said the "minor" firms named in the complaint were allowed to quote lower prices than the Big Four by "agreed-upon differentials."

Besides the Big Four and the two

[1] RUBBER WORLD, July, 1959, p. 596.

associations, the following were named in the FTC complaint: General Tire & Rubber Co., Armstrong Rubber Co., Cooper Tire & Rubber Co., Dayton Rubber Co., Dunlop Tire & Rubber Corp., The Gates Rubber Co., Lee Rubber & Tire Corp., The Mansfield Tire & Rubber Co., The Mohawk Rubber Co., and Seiberling Rubber Co. McCreary Tire & Rubber Co., Indiana, Pa., also was named in the complaint, but has not yet submitted its answers to FTC as have the others.

In other actions in October, FTC took a few more swings at two of the defendants in the tire-tube price-fixing case. It charged that Dayton Rubber has discriminated in price among wholesale purchasers of its fan belts, radiator hose, and other automotive products and has illegally fixed their resale prices. Lee Rubber, according to FTC, had engaged in deceptive advertising.

In its individual complaint against Dayton, FTC leveled charges on two counts: (1) the company charges different prices for the same product to competing wholesalers, a violation of the Robinson-Patman Act, and (2) it entered into agreements with distributors of Dayton products to "restrain price and other competition." This action is a violation of the FTC act, the agency said. It gave Dayton 30 days to answer the charges.

In its deceptive advertising complaint against Lee, FTC said the Conshohocken, Pa., firm failed to disclose in its advertising that it had lowered the quality of its premium tires. Lee's advertising in national magazines therefore "tends to mislead purchasers into believing they are buying a better-grade tire than is the fact," according to FTC. Lee also has 30 days to file a formal answer.

INDUSTRY NEWS

Vila Sees High 1960 Sales For In-Process Materials

George R. Vila, group executive vice president, United States Rubber Co., in a talk before the American Management Association's annual sales forecasting conference at the Hotel Biltmore in New York, N. Y., September 28, predicted booming sales in 1960 for the industrial raw materials rubber, metals, plastics, and chemicals and allied products. Only textiles would hold at the level estimated, he added, but this is still encouraging for 1959 has become a textile boom year. His talk was entitled, "1960 Outlook for In-Process Materials," and Mr. Vila also reviewed the annual performance of these broad industry groups since the year 1947.

The overall picture of recent gains in the in-process materials field is shown in Table 1. In this table the speaker gave 1959 estimated consumption for all in-process materials a value of 100, and from this base computed actual usage for the last two years and predicted consumption for 1960 on a percentage basis.

TABLE 1. CONSUMPTION IN-PROCESS MATERIALS 1957-1960

	1957	1958	1959	1960
Rubber	92	86	100	108
Textiles	86	85	100	100
Chemicals	92	91	100	106
Plastics	80	85	100	111
Metals	99	86	100	109
Total (weighted aver.)	93	87	100	107
FRB index of ind. prod.	95	89	100	105

Rubber

In rubber a well-defined boom crested in 1955, then production flagged as the ensuing recession set in, it was said. Bottom was reached in July 1958, and a recovery cycle started which carried the industry to maximum capacity operations in the first quarter of 1959. At this point strikes in a number of major rubber plants caused a severe readjustment, and the industry is only now nearing capacity levels again as it rebounds from this setback.

The 1960 outlook is for near-effective capacity operations with a new high in replacement tire sales and substantial gains in original-equipment tire sales, as compared with the past few years. Mechanical rubber goods such as belting, hose, and molded products made for industrial customers are expected to develop strong recovery tendencies during 1960. This area is closely correlated with industrial activity and follows the Federal Reserve Board Industrial Production Index. Footwear, flooring, drug sundries, sporting goods, and other consumer products are expected to continue at high levels recently enjoyed by this segment of the industry.

A table depicting rubber consumption since 1947 estimated total new rubber consumption in 1959 at 1,612,000 long tons, of which 557,000 tons would be natural rubber and 1,055,000 tons synthetic rubber, with synthetic amounting to 65.5% of the total. For 1960 total new rubber consumption was estimated at 1,630,000 tons, with 555,000 tons of natural used and 1,075,000 tons of synthetic, the latter rising to 66.0% of the total. Industry sales in 1959 were estimated at $6.25 billion and at $6.75 billion in 1960.

Because of the inflexible world supply of natural rubber, the general-purpose styrene-butadiene synthetic rubber, or SBR, is expected to encounter the highest demand in terms of absolute tons in its peacetime history and operate up to 80% of effective capacity, it was said. Demand for specialty synthetic rubbers, such as nitrile, neoprene, and butyl, is also expected to increase. The newest synthetic rubbers, polyisoprene (synthetic natural rubber) and polybutadiene, are expected to move into the initial phases of commercial production in 1960. These types will find a ready market in the truck-bus tire field.

Textiles

The textile industry had a vigorous upturn in the Summer of 1958, and this situation has continued in 1959, with an estimated 18% increase in 1959 over 1958, and a level of business in 1960 approximating the volume in 1959 was predicted.

An optimistic atmosphere exists in the textile industry at the present time, with U. S. synthetic fiber production at a record level in the second quarter, more consumer spending on non-durable goods, and the lessening of inter-fiber competition as end-use markets for natural and synthetic fibers have become more stabilized.

Chemicals and Allied Products

As a supplier to virtually all sections of industry, the chemical and allied products industry will benefit from all the factors that will push our economy upward in 1960. These included the predicted increase in automobile production and building construction; greater emphasis on rockets, missiles,

and space exploration; the stepped-up National Highway Program; greater use of petrochemicals; and growing need of more agricultural chemicals to maintain food production.

Total chemical and allied products sales of $25.5 billion are expected in 1959, an increase of 10% over 1958 figures, and a further 6% increase in 1960 to $27 billion was predicted.

Plastics

The plastics industry is currently producing its major raw materials at an annual rate of 5.4 billion pounds, or 17.4% over 1958 output. Since from 1950 to 1958 the growth rate of plastics production was 10%, compounded annually, a production of 6 billion pounds was estimated for 1960.

The boom in plastics was attributed to increased auto production, the revival of the consumer durable goods industry, and the spurt in commercial and industrial building construction which later should broaden the market for plastic flooring, decorative laminates, and plastic construction items.

The largest volume plastic is now polyethylene, followed closely by vinyl and vinyl copolymer resins. Polyester resins appear likely to increase in use by 35% in 1959 over 1958 consumption, and all other members of the plastics family will show sizable sales gains at the end of 1959, the speaker declared.

Although the most optimistic business observer would have hesitated to forecast the sales rise which has taken place in plastic since the end of World War II, forecasters now talk of the plastics industry doubling its present volume of business by 1965, Mr. Villa added.

Metals

The metals field was divided into steel, aluminum, copper, and lead and zinc. The broad upturn forecast for our total economy in 1960 will be reflected in steel, with a 1960 ingot production level of 127 million tons, a 19% increase over 1959 output, predicted. The reasons given for this increase were the catch-up period following the present strike, increased automobile production, new plant and equipment expenditures of $37 billion in 1960, defense expenditures of $47 billion in 1960, and a step-up in the production of machinery, appliances, railroad cars, etc.

Aluminum consumption of 2,150 thousand tons, a new high, was predicted for 1959, with still another record year in 1960, with consumption reaching 2,300 thousand tons estimated.

The copper industry is in a recovery cycle and should reach a consumption level of 1,375 thousand tons in 1959, an increase of 17% over 1958 use. Consumption in 1960 of 1,400 thousand tons was predicted. The long-range outlook for copper is considered to be good, with attempts at price stabilization by the mining industry and copper fabricators aggressively seeking new markets for copper through research, contributing to this outlook.

Both the lead and zinc industries are in the early stages of a recovery from a period of decline in 1957 and 1958. Lead consumption in 1959 is estimated by that industry at 1.05 million tons, or 7% higher than in 1958, and a further 7% increase is expected for 1960.

Zinc consumption at 925 thousand tons in 1959, or 13% above 1958 use, was estimated by that industry. Consumption in 1960 is expected to reach one million tons, a gain of 8% over the 1959 figure.

Summary

In summary, it was stated that a sales increase or a high level of sales is being anticipated for the in-process materials field in 1960. This survey disclosed, however, that the 10-year histories of the various industries involved cannot always be described in the bright terms that are being used to sum up their 1960 outlook.

In the years since 1947, of the five broad industry groups covered, only plastics, the smallest contributor to the Gross National Product, was able to approximate the rate of increase of the GNP during this period. Metals have literally staggered through this period, but are again going uphill toward a peak reached in 1951. Chemicals and allied products have fallen off, but since 1957 have stabilized their position. The textile industry has lost ground and is not expected to regain its 1947 position in the foreseeable future. The rubber industry has moved along at a relatively even pace, not quite matching strides with the general economy, but never falling more than a few steps behind.

The situation, of course, is not so clear cut as indicated above, but does indicate the constant struggle for a larger share of a growing market that exists within the in-process materials group. Unfortunately, progress is usually accompanied by a degree of attrition for some materials.

Midwest Rubber Wins Industrial Reward

In the ratings of the Nineteenth Annual Report Survey by *Financial World*, Midwest Rubber Reclaiming Co., East St. Louis, Ill., was judged as having the best annual report of the rubber industry. A bronze Oscar-of-Industry was presented to Howard Painter, executive vice president and treasurer of the company, at the annual awards banquet at the Hotel Astor, New York, N. Y., October 26.

Approximately 5,000 reports originally were entered in the 1959 competition. These reports were judged to determine the best ones in various industrial categories. In the rubber industry classification The Goodyear Tire & Rubber Co., Akron, O., placed second; while United States Rubber Co., New York, placed third.

Chairman of the jury which made the final selections was G. Rowland Collins, New York University. The screening of reports was under the direction of Lawrence R. Kahn, president of the New York Society of Security Analysts, Inc., with the cooperation of 23 investment analysts, all members of the New York Society.

Richard J. Anderson, editor and publisher of *Financial World*, presented the Oscar-of-Industry awards at the banquet, which attracted more than 1,000 business and financial leaders from the United States, Canada, and Latin America.

BFG Chemical Forms Textile Chemical Unit

A cross-linking of diversified chemical product lines into a marketing and development unit designed to increase its business in the $400 million textile chemicals market was recently announced by B. F. Goodrich Chemical Co., Cleveland, O., at a press conference at the Sheraton-Atlantic Hotel, New York, N. Y. The company opened a weeklong trade show at the hotel in which it demonstrated products and processes for improving such physical properties of fabrics as wear resistance, color fastness, hand and drape, stretch-control, ravel-resistance, and textile printing and coating. The textile chemicals which B. F. Goodrich Chemical supplies to the overall market, amounts to $50 million a year, reported H. B. Warner, vice-president-marketing of the division.

The exhibit, designed to inform fabric converters and finishers of the possibility of chemical treatment, features the following basic raw materials: vinyl, acrylic, nitrile and vinyl acetate latices, and Carbopol, a dispersing, suspending, and penetration control agent introduced by the company last year.

Warner also revealed that the company is experimenting with a new acrylic latex that may make possible the expansion of non-wovens into outerwear fabrics. Tests show the new latex simplifies compounding, reduces processing cost, increases stability, and provides the washability and dry-cleanability that heretofore have been major obstacles in using this type of construction for outerwear.

Some of the firm's textile chemicals make it possible to spray decorative finishes on fabrics. This means that "printing" can be done on a production-line basis by using spray equipment.

Industry News

Walker Now Executive And Technical Editor

Richard S. Walker, who has been technical editor of RUBBER WORLD since October, 1958, assumed the additional responsibility of executive editor last month. His new duties now include the overall responsibility for getting out each issue of the publication and supervision of the editorial staff. As technical editor, he will continue to participate in the editing of articles and other material which he has done so capably during the past year.

This realinement of his responsibilities is a part of a continuing plan for the growth of RUBBER WORLD and the industry it serves. It will relieve the editor and general manager, R. G. Seaman, of line responsibilities in order that he may concentrate more effectively on forward planning, increasing his industry and technical contacts, and inquiring into trends in basic and applied research and development in the rubber and supplier industries.

Dick Walker is a graduate of Lehigh University, where he received his B.S. in Chemical Engineering in 1950. He became a member of the technical staff of the molded rubber products firm of H. O. Canfield Co., Bridgeport, Conn., in 1951, advancing to assistant to the company's technical director. He was transferred in 1955 to the H. O. Canfield Co. of Virginia as chief chemist of that plant. Prior to joining RUBBER WORLD, he was a member of the nitrile rubber sales engineering staff of the Goodyear Tire & Rubber Co., chemical division, from 1957 on.

Richard S. Walker

New Technical Center Opened by UCC

Union Carbide Chemicals Co., a division of Union Carbide Corp., recently opened its new Technical Center at South Charleston, W. Va., at a ceremony officiated by E. E. Fogle, division president, and attended by some 150 educators and visitors. The new research-development-engineering complex is designed to bring the principal technical groups together in a modern center where their interrelated activities can be conducted most effectively.

With the recent completion of the engineering building, there are now five major functions housed in the Technical Center: research, development, and engineering departments of Union Carbide Chemicals Co., the engineering department of Union Carbide Olefins Co., and the design and construction department. In addition, work on resin research and development is also done for Union Carbide Plastics Co. Thus, at the Center a project can be carried out from basic research stage through plant construction supervision.

The scope of activity at the Center ranges from theoretical studies on molecular structure and basic research in chemical reaction mechanisms, to pilot-scale production of new products and the subsequent engineering and design of commercial production facilities.

The Technical Center now includes three major buildings for the research, development, and engineering departments; two high-pressure laboratories with a total of 39 test cells; one chemical and two plastics/resins pilot plants; applications research laboratory; radiation laboratory; cafeteria; and supporting facilities.

With a gross total of 15 acres of floor space, a mailroom handling 25,000 pieces of mail a day, a thousand-set telephone system, a cafeteria equipped to feed more than 2,200 researchers, and three libraries—the 12 buildings of the Technical Center form a nearly self-sufficient science city for its staff.

Other highlights of the Center include a highly automated air-conditioning system in the four-story engineering building; pretested laboratory modules in the development building based on the latest developments in laboratory design; luminous ceiling lighting in offices, hallways, and drafting areas; and IBM-computer report filing.

Though considered "complete," the Technical Center still has room to grow. Only 100 acres of the total 412-acre site are used at present. Careful planning has anticipated future extensions of the major buildings. Additional stories can be superimposed on wings of some buildings, and the ample size of the site permits the integration of entirely new structures within the Technical Center.

New BFG Retread Plant

Construction of a new retread plant that will triple the firm's present annual capacity for tire retreading in the San Francisco Bay area has been announced by the B. F. Goodrich Tire Co. Located in Oakland, Calif., the new production facility will serve motorists and truckers as far east as Reno, Nev. Construction of the 14,000 square-foot, one-story plant began in October, with occupancy in about 90 days, according to O. K. Lynn, San Francisco zone manager for the firm.

The present BFG retreading plant in Oakland will continue to operate at scheduled capacity until the new plant is completed. It will then be replaced by the new facility.

Installation of modern equipment, a newly designed plant layout, additional presses, and a greater number of matrices will give the new plant a production capacity of 9,000 tire retread units a month.

Louis R. McWhorter, manager of the BFG Oakland retread plant, will continue in that capacity. Operation of the plant is under the supervision of A. D. White, manager of the BFG retail store at 2726 Telegraph Ave., Oakland.

More Wage Increases

Additional wage settlements in the rubber industry have followed those of the major rubber companies announced last month.

Hodgman Rubber Co. granted a 5¢-an-hour general wage increase, effective September 15. This increase was agreed to while the company was negotiating a new one-year labor contract which contained no basic changes with the union.

Gates Rubber Co. agreed to a 10¢-an-hour increase effective September 7; Windram Mfg. Co. increased wages 6½¢ an hour, effective September 1; Seiberling Rubber Co. at Barberton granted a 10¢-an-hour increase on September 7; and Mansfield Tire & Rubber Co. at Mansfield increased wages 10¢ an hour on September 8.

Electric Hose & Rubber Co. granted a 10¢-an-hour increase on September 1. In addition, a new two-year labor contract was negotiated which provides for four weeks vacation after 20 years of service and which establishes a set rate per hour formula in lieu of a percentage formula in computing night bonuses. A five-year pension plan was also agreed to based on a minimum of $2.10 per month per year of service.

To Up Moplen Output

Novamont Corp. has announced plans to more than double Moplen polypropylene production capacity of its Neal, W. Va., plant to 25 million pounds annually, according to Lucio Lucini, president. In making the announcement on his return from the Milan headquarters of Montecatini, parent company of Novamont, Lucini stated that plant designs have been revised to accommodate the new production figure. Construction start-up is scheduled to begin in November, and the plant is slated to go on stream early in 1961.

Originally the capacity of the plant, Montecatini's first American industrial venture, was set at slightly more than 11 million pounds, but market potential and growing interest have prompted the firm to expand its marketing goals.

Novamont's Neal plant will be situated on a 200-acre tract on the Big Sandy River. Besides Moplen isotactic polypropylene, other polyolefins important in the manufacture of high-quality plastics, textile fibers, and yarns and elastomers will also be produced. Polypropylene is available as resin for compression molding and extrusion; as stable, monofilament and multifilament for textile alone or in blends with natural fibers; and as film for a wide range of packaging applications.

Pawling Rubber Corp. Licenses French Firm

The Pawling Rubber Corp., Pawling, N. Y., has licensed a leading French rubber goods manufacturer, Société des Procédés Fit, Grenoble, France, to produce appliance, construction, and household products for the European Common Market. The licensing agreement follows extensive negotiations between the two companies that included an exchange of top management and technical personnel between the firms, according to Howard W. Smith, Pawling president.

FIT was founded in 1924 and is well known in France for its products manufactured for the shoe, automobile, railroad, and tire industries. The company is also a supplier of rubber products to the French armed services. According to M. Jean Ozanne, director general of FIT, Pawling Rubber was selected from the many companies he visited in the United States.

The long-term agreement grants to FIT the exclusive right to produce Pawling's patented extruded rubber products, including Parco-Link entrance mats for homes, schools and industry, and Pawling's patented rubber gaskets for sealing curtain-wall panels in the construction industry.

Pawling will supply to FIT complete technical and engineering assistance to develop production processes as well as necessary production equipment to meet requirements of the new FIT plant expansion.

Later in the month Pawling made another announcement that it has licensed a leading western rubber manufacturer, Griffith Rubber Mills, Portland, Oreg., to manufacture its building construction and consumer rubber products for distribution on the West Coast.

The agreement, which covers 17 western states, grants Griffith the exclusive right to produce Pawling's patented extruded rubber products including Parco-Link entrance mats for homes, school, and industry. Griffith will also manufacture Pawling's patented rubber gaskets used for sealing curtain-wall panels and glazing in the construction industry. The agreement further provides that the Pawling firm will supply Griffith with complete technical and engineering assistance to develop production processes and to meet the requirements of new Griffith expansion plans.

Caldwell Changes Name

The Caldwell Co. has changed its name to Americhem, Inc., effective October 1, and has moved to a new address, 1651 Home Ave., Akron, O.

The Caldwell Co. has been in business in Akron for 16 years as a manufacturers' representative and development company, handling chemicals for the rubber, plastics, and paint industries. These chemicals include plasticizers, polyester and alkyd resins, stabilizers, stearates, fillers, colors, and various other compounding ingredients.

Americhem, Inc., represents: Synthetic Products Co., Greensboro sales division of Chas. Pfizer & Son, Inc., Diamond Mica Co., Thompson-Weinman & Co., Resyn Corp., and B. F. Drakenfeld Co.

The firm has developed a line of color dispersions and an adhesive which is used for applying rubber and vinyl tile on and below grade. This adhesive is packaged under the label of several of the country's largest vinyl and rubber tile manufacturers.

The officers and owners of Americhem, Inc., are: Sylvester S. Caldwell, chairman of the board; Richard H. Juve, president; and Harvey E. Cooper, vice president and treasurer.

Thomas Urges Safety

The sites of traffic fatalities should be commemorated with markers that would be as recognizable as a danger signal to motorists as the whirring of a diamond-back rattler or the arm-wrenching pain of a cardiac, said E. J. Thomas, chairman of the board of The Goodyear Tire & Rubber Co., to the National Safety Congress in Chicago recently. Such markers, uniform in all states, might rock the too-many-cocktails driver, the marathon-talk motorist, and the one-armed romantic back to greater highway caution, he added.

Thomas suggested that industry and governing bodies join together under the leadership of dedicated and professional safety experts in an all-out campaign to reduce the accident toll in plants and on the highways.

Possibly the most dangerous part of a man's job today is the trip he makes to and from his place of employment, he declared. Great forces of improvement are at work in this area. Cars are being made safer. Certainly today's tires are safe tires—far superior to any others in history. But drivers themselves must use more restraint, courtesy, and good sense, and he believes that in our in-plant safety instruction we should continue to drive home these thoughts, the speaker stated.

Highway safety can be encouraged by laws that guarantee sure, swift, and severe penalties for unsafe drivers, Thomas said, citing Connecticut's stern attitude and Pennsylvania's compulsory vehicle inspection program as effective actions in this direction.

Goodwill Message Sent to French Plant

A goodwill message inscribed in rubber from the people of Akron, O., rubber capital of the world, to the people of Amiens, France, was recently unveiled along with the cornerstone for The Goodyear Tire & Rubber Co.'s new tire and tube manufacturing plant to be located on a 72-acre site in Amiens just 80 miles north of Paris.

The message, signed by The Honorable Leo Berg, Mayor of Akron, is addressed to The Honorable Maurice Vast, Mayor of Amiens, and welcomes the people of Amiens into the Goodyear worldwide organization. Actual ceremonies, signaling the laying of the cornerstone, were set for November 3 at the plant site.

The Goodyear Amiens plant, estimated to cost $7 million, will be equipped with the most modern tire manufacturing equipment. Passenger, truck, and farm tires for replacement and original equipment will be produced for France and the Common European Market and for export.

The plant is being designed in France, and, with the exception of specialized tire-making facilities, all machinery will be purchased in that country. Amiens has excellent facilities for industry from the standpoint of water, labor, and transportation.

The plant is the fifteenth overseas facility to be built by Goodyear.

NEWS BRIEFS

HALE & KULLGREN, Akron, O., division of Blaw-Knox Co., Pittsburgh, Pa., has appointed sales representatives in two offices: Haddon Heights, N. J., Blackhorse Pike and High St.; and at Houston, Tex., 3402 Mercer St.

THE GOODYEAR TIRE & RUBBER CO., Akron, O., has been awarded a million-dollar contract for 500, 10,000-gallon pillow-type storage tanks by the Army Corps of Engineers. It is the second major contract received by Goodyear in the past year from the Corps of Engineers. The two orders call for more than 1,100 of the rubberized fabric storage tanks at a cost of nearly $2.5 million. Goodyear's pillow tanks, which are constructed of synthetic rubber-coated nylon, are comparatively lightweight, easy to handle, and can be rolled up like a rug when not in use.

UNION CARBIDE CONSUMER PRODUCTS CO., division of Union Carbide Corp., New York, N. Y., has announced that its new product, "Prestone" Rubber Lubricant, is excellent for mounting and demounting tubeless tires and tires with tubes, and helps prevent bead damage and eases bead seating. For under-car lubrication, the product penetrates dirt and removes squeaks in rubber bushings. It can also be used to clean and beautify all rubber accessories including floor mats, tires, moldings, and other products. The product, a combination of lubricants and inhibitors, comes in a convenient, concentrated form easily diluted in water.

B. F. GOODRICH INDUSTRIAL PRODUCTS CO., according to Vice President James C. Richards, has developed a film claimed strong enough to be made into a range of products from flexible gas tanks for automobiles to rugged rainwear. The new material derived from Estane VC, a polyurethane, will be of special interest to manufacturers who now must support films with fabric backing whenever stitching is required. Its sheer strength and tear resistance, even when stitched, may lead to its replacing more expensive films that must be reinforced with fabric for greater strength. The United States Patent Office has granted B. F. Goodrich a patent on the new material.

E. I. DU PONT DE NEMOURS & CO., INC., will build a new plant to make methylamines at its Belle, W. Va., site, which will more than double its capacity for methylamines, now made at the Houston, Tex., works. Dimethylamine (DMA) is a liquefied gas used in the manufacture of liquid missile fuel, fungicides, 2,4-D herbicides, pharmaceuticals, rubber chemicals, antioxidants, and solvents. In addition to DMA, the plant will make the methylamine derivatives dimethylforamide (DMF) and dimethylacetamide (DMAC). Construction will begin early next year with completion expected in the first quarter of 1961.

THE GOODYEAR TIRE & RUBBER CO., Akron, O., has designed and built tires capable of running at more than 400 miles per hour for speed enthusiast Mickey Thompson. Thompson broke four world records in speed runs at Bonneville, Utah, October 6, but failed in his objective of breaking John Cobb's world record of 398.1 mph. for the one mile before rains drenched the salt-bed track. The design of the tire is for a treadless, high-pressure, tubeless tire with cords running at radically low angles—some layers, known as restraining plies, running almost directly around the circumference of the tire.

HEWITT-ROBINS, INC., Stamford, Conn., has announced the shutdown and liquidation of its rubber foam cushioning production facilities at Buffalo, N. Y. The decision arose from the trend of its new polyurethane foam cushioning, produced at Franklin, N. J., which has been gradually replacing the rubber foam line. The statement, made in the annual report to company stockholders, indicated that there has been a deteriorating price situation in rubber foam, causing heavy annual losses in this product line in recent years and culminating in drastic additional price cuts initiated in the industry in July, 1959.

Raymond C. Firestone, *left*, president, Firestone Tire & Rubber Co., inspecting Firestone exhibit at the New York Stock Exchange, with Edward C. Werle, chairman of the board of the Exchange, on September 30 at a reception by Firestone in connection with the opening of the exhibit for one year. Passenger-car and racing tires and color film, tape recorded messages about them are featured, together with continuously projected color slides of the winners of the Indianapolis 500-mile race on Firestone tires since 1911. Included also was a display of the six industrial fields of activity of Firestone: rubber, metals, plastics, synthetics, textiles, and chemicals.

News Briefs

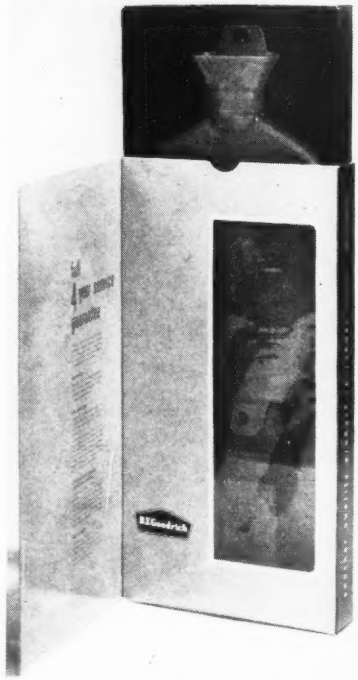
STEWART BOLLING & CO., INC., Cleveland, O., is developing a line of plastic extruders with electrically heated barrels, having exceptional temperature-control features obtained from heating elements of unique design. Ratios up to 22:1 on the 2½-inch worm size are now available for quick delivery. Additional sizes will be offered after they have undergone adequate field tests.

WEST AMERICAN RUBBER CO., Los Angeles, Calif., has announced, after five years' development, an improved vinyl and butyl laminated pipe-wrapping tape. Called Warco Laminated Tape, it combines the advantages of a heavy mastic layer of butyl with a tough outer cover of vinyl. The butyl compound provides a permanent seal which fills all pits and prevents moisture migration at the overlap. The vinyl backing is designed to provide a maximum resistance to both abrasion and punctures from backfilling. It is manufactured to the highest specifications covering tensile strength, tear resistance, dielectric strength, and other qualities. The tape, applied with a specially compounded primer and either by hand or machine, is available in a wide range of thicknesses and widths.

COLUMBIA-SOUTHERN CHEMICAL CORP., Pittsburgh, Pa., will obtain the balance of the stock interest in Columbia-National Corp. now held by National Research Corp. Columbia-National, with plant at Pensacola, Fla., produces zirconium sponge for the Atomic Energy Commission and other customers. The firm was established in 1956 and has operated since 1958 with C-S owning 50% of the stock plus one share and with NR owning the remaining shares. Under the plan of reorganization, Columbia-Southern obtains all of the outstanding stock of Columbia-National. In exchange, National Research will receive 10,000 shares of Columbia-Southern's 4% convertible voting preferred stock with a par value of $100 per share.

UNITED STATES RUBBER CO., New York, N. Y., reports that its Shor-Kwik inflatable dunnage cushions[1] are being used for securing electronic equipment while it is being shipped across the country by trailer-truck. The dunnage units are placed between data processing machines made by International Business Machines Corp. and the trailertruck walls. IBM follows four steps in using the 4 by 5 size dunnage units. The equipment is placed on the center of the trailer. The dunnage units are then partially inflated for easier handling and placed in the voids between equipment and walls. Then they are further inflated, to about one psi.

[1] Rubber World, Dec., 1957, p. 460.



New packaging concept of B. F. Goodrich

THE B. F. GOODRICH CO., Akron, O., has announced a program to increase its sales in the $75-million prescription accessories market. Water bottles and other items heretofore plainly packaged are now being packaged in boxes whose protective cardboard lids open like a hard-cover book, with the visage of an attractive model inviting prospective customers to peer inside. Syringes and similar items are being repackaged in trim air-foil-like packages. A sales meeting program is being launched to introduce the new package concept to wholesalers and drug chain outlets. The program involves the repackaging of 45 items including BFG water bottles, fountain and folding syringes, bulb syringes, infant and ear syringes and nasal aspirators, as well as baby water bottles, baby pants, crib sheets, and household gloves. The packages were designed by Smith, Scherr, McDermott.

THE LEE RUBBER & TIRE CORP., Conshohocken, Pa., has purchased all the rubber hardware and housewares production molds and equipment of the Dural Rubber Co., Flemington, N. J. Lee, a major producer of rubber housewares, has added the equipment to its Conshohocken facilities, and the line of products formerly produced by Dural will be included in the forthcoming Lee catalog. This acquisition is another step in Lee's expansion program, assuring customers the continued quality which has been a significant part of Lee's 76 years in the rubber industry.

THE GOODYEAR TIRE & RUBBER CO., Akron, O., is now offering all employes with two or more years of college the chance to work toward job-related college degrees—bachelor's and advanced—with Goodyear paying the tuition. Goodyear expects that the revised program will become popular with office and non-technical employes seeking further education and with candidates for Ph.D.'s for whom a special program has been arranged. The new plan reimburses all candidates for bachelor's degrees with full tuition for nine semester credit hours for each year. Those working toward a master's degree may have tuition reimbursed in full for all semester hours. The program is open to all domestic Goodyear employes, including field sales personnel.

CHEMETRON CORP.'S Cardox division is constructing a plant near Philadelphia which will be the largest carbon dioxide producing facility in the Northeast and one of the largest in the United States to recover CO_2 from ammonia. The plant, being built at Gibbstown, N. J., will have a daily production capacity of 155 tons of liquid and solid CO_2. The output will be distributed from Maine to Virginia in liquid and dry ice forms to various industries including beverage, food, transportation, foundry, rubber, paint, metals, aviation, welding and fire protection. Manager will be Douglas Clipp, who has been manager of the Cardox facility at Monee, Ill. Raw material will be supplied by a nearby Du Pont ammonia plant.

B. F. GOODRICH AVIATION PRODUCTS, a division of The B. F. Goodrich Co., Akron, O., has been awarded a subcontract for the development and production of the wheels and brakes for the nose and main gears on North American Aviation's triple-sonic B-70 bomber, according to Sam S. Mullin, president of Cleveland Pneumatic Industries. Cleveland Pneumatic, as previously announced, was awarded the contract to develop and manufacture the landing gear systems on the new plane by North American, the weapons system contractor.

THE GENERAL TIRE & RUBBER CO.'S M. G. O'Neil, vice president and executive assistant to the president, recently told the Boston Society of Security Analysts that the rubber industry is expected to ship 67,800,000 replacement passenger tires and 9,300,000 truck tires in 1960. In addition, the industry will ship 33,200,000 passenger tires and 4,800,000 truck tires as original equipment. The grand total is 116,000,000 tires, or five million more than the 1959 total. O'Neil predicted that Detroit would produce more than 6,000,000 passenger cars and 1.2 million trucks in 1960.

News Briefs

UNITED CARBON CO. and EL PASO NATURAL GAS PRODUCTS CO. have announced the sale of United's minority interests in Odessa Butadiene Co. and Odessa Styrene Co. to El Paso. El Paso is the operator and majority holder in both firms, located in Odessa, Tex. Through the acquisition, El Paso attains 100% ownership of the styrene company and 75% ownership of the butadiene company. Both Odessa companies have shown very good growth; however, United Carbon wishes to concentrate more of its investment capital on increased or improved carbon black and rubber manufacturing facilities and other ventures in the petrochemical and polymer fields.

WELLCO SHOE CORP., has announced an expansion program designed for ultimately doubling present production at its Waynesville, N. C., plant. A new two-story, 30,000-square-foot process building, plus renovation of some of the present buildings, is included in the long-range program, designed to get under construction prior to January, 1960. Daily production of slippers and casuals is now between 6,500 and 7,000 pairs, in the plant, which is one of three plants producing the firm's footwear, for the United States market. The present main building will be converted into a warehouse for shoe stock storage. Plans call for expanding this building from 19,000 square feet to 32,000 square feet.

UNITED STATES PATENT NO. 2,908,676 for the invention of BUNAC-KS has been issued posthumously to the estate of Edward A. Van Valkenburgh, formerly of Greene, N.Y., who died last December 26. This invention, used in reclaiming rubber, would have been the deceased's ninth U. S. chemical patent, all having to do with the processing of natural and synthetic rubber and plastics. Licenses available in his portfolio, including the well-known product D-74, may be obtained through the executors of his estate, P. O. Box 566, Greene, N. Y.

GERING PLASTICS DIVISION, Studebaker-Packard Corp., Kenilworth, N. J., is now producing its new Ger-Pak heavy-gage seamless, wide width, polyethylene sheeting, available in thicknesses up to and including 15 mils. Representing the latest advances in extrusion techniques, the new sheeting is believed to be an industry first. Ger-Pak heavy-gage sheeting is available in black and natural-clear in 20-, 28-, and 32-foot widths. Shipped in gusseted rolls for ease in packing, shipping, and handling, the sheeting is applicable to such diversified service as irrigation ditch and pond liners, fumigation blankets, tarpaulins, agricultural and industrial covers of all types.

E. I. DU PONT DE NEMOURS & CO., INC., Wilmington, Del., reports that many of the major commercial airlines have adopted gaskets made of its "Viton" fluorocarbon rubber to seal manifolds carrying supercharged air to cylinders in turbo compound engines. The seals remain efficient at temperatures above 300° F., reports Du Pont, where conventional elastomers crack and grow brittle. Parts of "Viton" have been approved for constant exposure up to 500° F., with intermittent exposure up to 1,000° F. Also, the manifold gaskets have stood up successfully against oil vapors and fumes that sometime mix with the supercharged air. Curtiss-Wright engineers, who built the engines, designed into each engine 36 gaskets of "Viton" to seal lines, giving a total of 144 seals used on each plane.

THE GOODYEAR TIRE & RUBBER CO.'S chemical division, Akron, O., has introduced a new synthetic resin latex designed for use in upholstery backings, textile sizings, adhesives, textile printing inks, and carpet backing. Called Pliolite Latex 140, the new product was first exhibited at the opening of the 1959 Textile Show sponsored by American Association of Textile Chemists & Colorists. Containing a non-staining antioxidant system, the product is a water dispersion of a styrene-butadiene copolymer. At room temperature it forms tough, flexible films with low odor, excellent clarity and adhesion, high pigment binding and mechanical stability. A sister product, Pliolite Latex 141, an identical product except it has no antioxidant, was also introduced for those users who prefer to add their own particular antioxidant.

THE B. F. GOODRICH CO., Akron, O., has produced a movie, "Tommy Gets the Keys," which is dedicated to making the nation's youth safer drivers. The film will make its television debut this fall. Endorsed by the National Safety Council, the film covers high points of an ideal training program and encourages proper training of young drivers. In addition to TV distribution, the 13½-minute film will be available in most communities throughout the nation for screening in schools, before safety and civic groups or service clubs. Arrangements for such showings can be made through local BFG representatives.

BURGESS PIGMENT CO., Sandersville, Ga., producer of hydrous and anhydrous aluminum silicate pigments and kaolin clays, is installing a new Nichols Herreshoff calcining furnace. The completion of this installation around November 1 will more than double the firm's production capacity and enable it better to serve the needs of the rubber and plastics industries.

MARBON CHEMICAL DIVISION, Borg-Warner Corp., reports that Harwick Standard Chemical Co. of California, Los Angeles, Calif., will now distribute Marbon products in the state of Colorado. For the past nine years, Harwick has been Marbon West Coast representative, covering California, Washington, Oregon, Nevada, Utah, and Arizona.

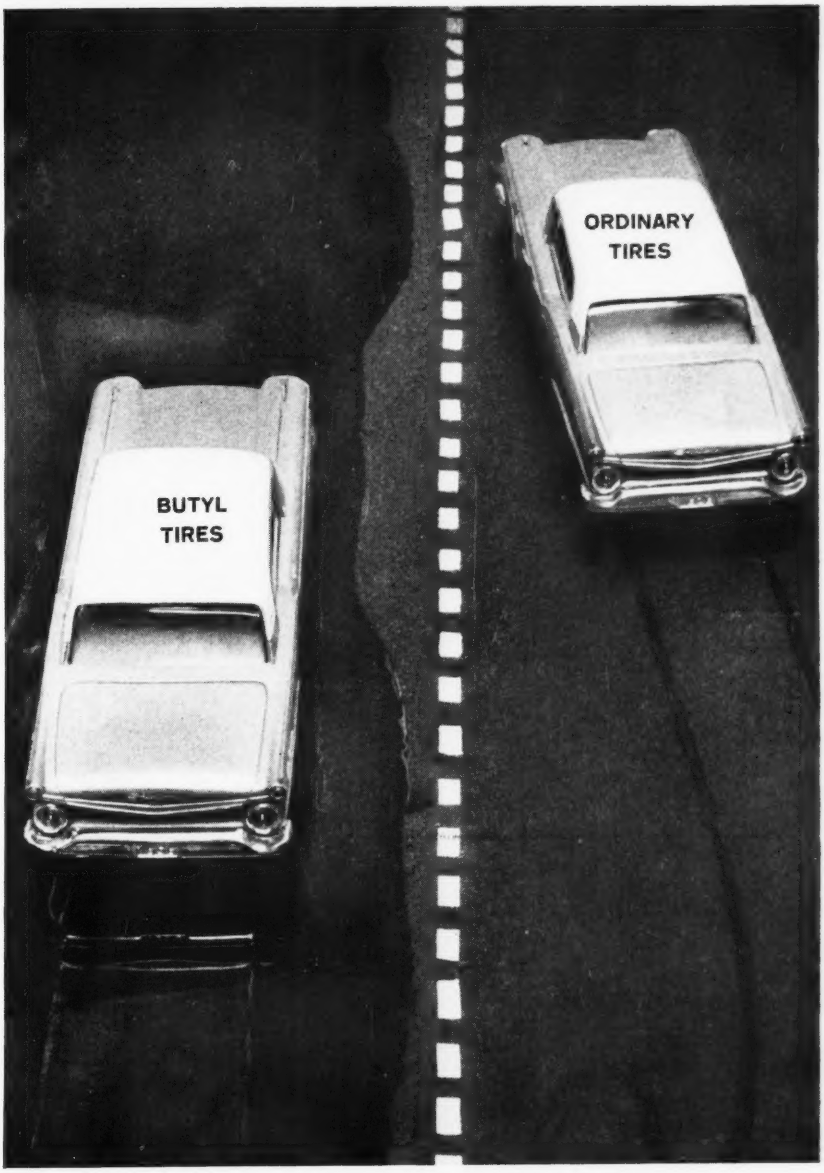
REPUBLIC RUBBER DIVISION, Lee Rubber & Tire Corp., Youngstown, O., enters the swimming pool accessory field with a unique line of plastic vacuum cleaner hose, designated the Vanguard. The Vanguard, a new concept in hose design and construction, has an extruded vinyl plastic cover which is fabricated in a continuous cycle, not merely wrapped construction like other hose lines. A double thickness of plastic enables the hose to stand up longer to abrasive wear. A unique coupling arrangement, called the Vacuum-Loc, allows a hose splice to be made in three minutes. Tapered plastic inserts are fitted into the hose ends, and the ends screwed into a plastic connector.

MARTIN RUBBER CO., INC., Long Branch, N. J., reports that owing to persistent demand for its Muscle Builder, a rubber exerciser, the company has started manufacturing and distributing the product again. It is packaged in a polyethylene bag. Further details are available from the manufacturer.

UNITED STATES RUBBER CO., New York, N. Y., is importing the Englebert Stabi 6 tubeless tire which is original equipment on Renault 4CV and Renault Dauphine for distribution through U. S. Royal dealer outlets. The tire is made in the Clairoix, France, plant of Société Française du Pneu Englebert, an affiliate of U. S. Rubber. It is being imported in size 135 x 380 only, the metric equivalent of domestic size 5.00 x 15 inches, with and without a white sidewall, in rayon cord construction.

B. F. GOODRICH CHEMICAL CO., Cleveland, O., reports that its Geon vinyl is being used by steel producers such as United States Steel Corp. as a finish on sheet steel, where previously a baked enamel was employed. Vinyl-coated steel is now being used by furniture and appliance manufacturers to give their products a durable, furniture-like, quality finish. When applied to sheet steel, the vinyl coating can be embossed with any texture that can be engraved on a printing roll and can be produced in specified colors with assurance of color uniformity. Goodrich Chemical worked closely with U. S. Steel and its suppliers in the vinyl-coated steel development.

ENJAY BUTYL RUBBER MAKES TIRES PERFORM BETTER



Enjay Butyl does amazing things for tires. This picture demonstrates how tires of Enjay Butyl stop faster on wet road than ordinary tires do on dry road.

A revolutionary new tire is being made today. It's made of Enjay Butyl rubber to bring new highs in traction and shock absorption while allowing designers greater freedom in tread and cord design Butyl thus enables tire manufacturers to produce tires with unique silence, safety, appearance and comfort.

SAFETY AND SILENCE — So effective is the traction of Enjay Butyl tires, that they stop up to 30% faster than ordinary tires! Stop faster on wet roads than other tires do on dry! And Butyl tires will not screech on any corner at any speed!

RIDING COMFORT — Because Butyl absorbs shock energy more completely, Butyl tires literally upgrade riding comfort in any car. Detroit engineers report tires of Butyl will help minimize the need for major engineering changes to overcome vibration and noise in tomorrow's new cars.

UPGRADES OTHER PARTS, TOO — Enjay Butyl is already used in more than 100 places in today's cars — parts such as inner tubes, weatherstrips, shock absorbers, motor mounts. Let us show you how Butyl can help make better rubber products. Call or write your nearest Enjay office.

ENJAY® BUTYL

EXCITING NEW PRODUCTS THROUGH PETRO-CHEMISTRY

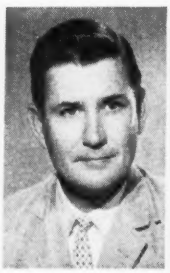
ENJAY COMPANY, INC., *15 West 51st Street, New York 19, N. Y.*

Akron • Boston • Charlotte • Chicago • Detroit • Los Angeles • New Orleans • Tulsa

NEWS about PEOPLE

Dewey F. Gross has been named sales manager for Fisk tires, according to **Gerald W. Brooks,** director of marketing for the tire division of United States Rubber Co., New York, N. Y. Gross, formerly assistant director of private-brand tire sales, succeeds **L. B. Lillie,** who has been named manager of franchise outlets for the U.S., Fisk, and Gillette tire divisions of the company.

R. E. Bagby has been appointed district sales manager for the Firestone Synthetic Rubber & Latex Co., in charge of the new sales office at 2706 W. 79th St., Chicago, Ill., according to **W. F. Jordan,** sales manager. With Firestone since 1948, Bagby started in the industrial products division. He transferred to the rubber purchasing department as procurement agent for synthetic rubber in 1954 and a year later was named a sales representative for the Firestone Synthetic Rubber & Latex Co.


R. E. Bagby


D. E. Eisenhart


D. S. Phillips


E. H. Ketner

Billy E. McCardle, of Charlotte, N. C., has joined the Dewey & Almy Chemical Division, W. R. Grace & Co., as sales representative for organic chemicals in North and South Carolina and southern Virginia. He was formerly with Southern Sash Sales & Supply Co.

George H. Murphy, plant engineer at The B. F. Goodrich Co.'s Miami, Okla., tire plant for the past eight years, has been appointed superintendent of maintenance and construction for the company's Akron, O., plants. Also, **John S. P. Wilson, Jr.,** has been named director of personnel for the company in Akron. Formerly corporate union relations representative for BFG, he replaces **Robert T. Jarmusch,** who has resigned.

William H. White has been elected director of Raybestos-Manhattan, Inc., Passaic, N. J. He fills a vacancy left by the recent resignation of **R. J. Gorecki.** White, who started with the Manhattan Rubber Division in 1916, held a number of positions until he became chief accountant of the Division in 1930. In 1946 he was appointed main office accountant for Raybestos-Manhattan, then elected assistant secretary in 1951, assistant treasurer in 1958, and treasurer of the company in April, 1959.

Harry G. Bimmerman has been assigned to the newly created position of manager-personnel planning of the elastomer chemicals department, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. and, effective November 1, he took on the added duties of manager-rubber chemicals. **Arthur C. Stevenson,** assistant director of the elastomers laboratory, succeeds Bimmerman as director. **Malcolm A. Smook,** a laboratory division head, replaces Dr. Stevenson as assistant director in charge of development. **John S. Rugg,** also a division head, is now an assistant director, with responsibility for customer service. **Chester C. McCabe** and **C. Minor Barringer** have been appointed division heads. Responsibility for the sale of "Viton" synthetic rubber has been assigned to **William H. Ayscue,** who now is sales manager for "Viton" and Hylene organic isocyanates.

C. A. McKenzie has been appointed manager, special projects in the economics and development group, Polymer Corp., Ltd., Sarnia, Ont., Canada, according to **Stanley Wilk,** vice president—finance. McKenzie will be handling business development projects as part of the company's intensified planning and development program. He has served the company for 17 years in the laboratory, chemical engineering, and instrument departments, with an interruption of two years in the Navy.

Samuel R. Phillips has been appointed general manager of Latex Fiber Industries, Inc., a subsidiary of United States Rubber Co., and jointly operated with J. P. Lewis Co., at Beaver Falls, N. Y. Phillips most recently was assistant general manager of the rubber company's textile division. Latex Fiber Industries produces a wide line of latex-impregnated or bonded-fiber materials, employed as a fabric or leather replacement in the coated fabrics, bookbinding, gasket, and shoe industries.

E. H. Ketner has been named to the newly created post of latex trade sales manager for the Firestone Synthetic Rubber & Latex Co., Akron, O., according to **W. F. Jordan,** general sales manager for the division. Two new sales representatives have been added to the sales division: **Donald S. Phillips,** appointed sales representative for the southeastern states; and **David Eisenhart,** sales representative for sections of Ohio, Indiana, Michigan, Pennsylvania, and West Virginia.

Roger B. Sammon has been elected president of Stein Hall, Ltd., Toronto, Ont., Canada, the Canadian subsidiary of Stein Hall & Co., Inc. In a shift of top officers, **David McGill,** former president, became chairman of the board; Sammon moved into his new position from that of vice president, and Vice President **Robert Strasser** became executive vice president. Stein Hall, Ltd., in operation since 1934, manufactures a complete line of adhesives, both liquid and dry.

Edward V. Ecklund has been elected assistant treasurer of Acme-Hamilton Mfg. Corp., Trenton, N.J., manufacturer of industrial mechanical rubber goods, with two plants in Trenton and branch offices principal cities throughout the United States.

John S. Hanse has been named national trade sales manager—tires of The General Tire & Rubber Co., Akron, O. He succeeds **L. L. Higbee,** who becomes General Tire's western regional sales manager. **Earl H. Schaub** follows Hanse as the Los Angeles division sales manager.

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D


J. C. Hahn


P. R. Scarito


J. C. Kancylarz


F. T. Reynolds


H. W. Sutton

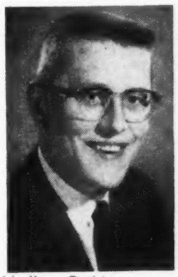

W. L. Pearson

Philip R. Scarito, James C. Hahn, John C. Kancylarz, and **Raymond T. Bohn, Jr.,** recently were assigned executive positions with Cary Chemicals, Inc., of East Brunswick and Flemington, N. J. Scarito is vice president in charge of compounding and calendering at the East Brunswick plant. Previously he had been East Brunswick works manager. Hahn becomes vice president in charge of the polymer division at Flemington, after having been works manager at the Flemington plant. Kancylarz, now assistant vice president, director of public relations and personnel, has been with Cary since the company was founded. Bohn replaces Hahn as works manager for the Flemington plant. He was formerly with Monsanto Chemical Co., Springfield, Mass.

Ernest L. McClure, Jr., becomes sales engineer for Goodrich-Gulf Chemicals, Inc., Cleveland, O., assigned to the southern and southwestern area and headquartering in Memphis, Tenn. Joining the company's sales service laboratory in 1957, he was transferred to the sales office in Cleveland in 1958 for further training, where he remained until his present assignment.

Bernard Adinoff has been named chief chemical engineer of Fruehauf Trailer Co., Detroit, Mich., according to **K. W. Tantlinger,** vice president of engineering and manufacturing. Dr. Adinoff will be responsible for development, design specification, and usage of urethane foam for refrigerated trailer insulation and other materials used in Fruehauf trailers. Previously he had been assistant director of research and development for The Dayton Rubber Co.

Ted A. Rohlfsen has been appointed manager of the South Pacific Coast division of Oakite Products, Inc., pioneer manufacturer of specialized chemical compounds for industrial cleaning and metal treating. He succeeds **J. C. Leonard,** who is retiring after 35 years with Oakite. Rohlfsen, who joined the firm in 1947, in his new position will direct the activities of 14 technical service representatives in Southern California's industrial community.


Madison Geddes

E. L. McClure, Jr.


Fabian Bachrach

S. B. Coco, Jr.

Samuel B. Coco, Jr., has been made administrative assistant to **Owen J. Brown, Jr.,** vice president and director of sales for Godfrey L. Cabot, Inc., Boston, Mass. Coco transfers from the Cabot sales offices in Akron, O., where he served since 1956 as carbon black sales representative and special technical consultant on bulk handling and packaging service matters. In 1950 he joined the engineering staff of Cabot Carbon Co., subsidiary of Godfrey L. Cabot, Inc., and headquarters for the southwestern operations. In 1952, Coco was appointed administrative assistant to the general superintendent of carbon black production. During the following year he was named first chairman of Carbon Black Packaging, Inc., industry-wide organization formed to study and improve methods for the packaging of carbon black.

Edward A. Gottschalk and **Dale J. Bartizal** have been appointed sales representatives of American Mineral Spirits Co., Chicago, Ill. Gottschalk, now representing the complete line of technical naphthas, petroleum solvents, and waxes in the Chicago area including both Lake and Cook counties, has been with the company since 1956. Bartizal will be concerned with the Midwest area, including southern Wisconsin, northern Illinois, and the north part of Indiana, and eastern Iowa.

Harold B. Wright has been appointed sales manager of Royalite plastics, by the United States Rubber Co., with headquarters at the Chicago, Ill., plant. Wright was formerly Royalite commercial products sales manager.

F. T. Reynolds has been appointed staff assistant to **W. F. Jordan,** general sales manager, the Firestone Synthetic Rubber & Latex Co., Akron, O. **Harry W. Sutton** was named technical service manager for rubber, and **W. L. Pearson** was promoted to the post of technical service manager for latex. Reynolds joined the synthetic rubber division in 1957 as a sales representative. Sutton joined Firestone two years ago as a technical service representative after nearly 30 years' experience in the development and manufacture of mechanical rubber goods. Pearson joined Firestone in 1958 after several years' experience in the fields of natural and synthetic rubber uses.

George L. Innes becomes director sales and development for Michigan Chemical Corp., St. Louis, Mich., and will be in charge of Michigan's chemical sales and market development activities. He has had wide research, market development, and sales experience in the chemical and chemical processing industries, with Monsanto Chemical, Ciba, Nopco Chemical, and Jefferson Chemical, and most recently he was manager of the chemical sales and development division of Climax-Molybdenum Co.

Robert E. Elliot and **William A. Hubbard** have been appointed to two newly created positions within the marketing department of Amoco Chemicals Corp., Chicago, Ill. Elliot becomes manager-industrial chemicals services and is responsible for the product technology and technical service of the firm's industrial chemical lines as well as for advertising and sales promotion for the entire company. He was formerly Chicago district manager and for 10 years prior to the formation of Amoco had been a salesman for Indoil Chemical Co., one of Amoco's predecessor companies. Hubbard, most recently assistant to the general sales manager, becomes manager-industrial chemicals sales and is responsible for directing sales through the company's district offices. **Fred H. Moulton** has been appointed district sales manager-Chicago, succeeding Elliot. Moulton has been the St. Louis sales representative for the firm for about two years.

News about People

C. S. Terry becomes a molding engineer with the sales-service group of Marbon Chemical Division, Borg-Warner Corp., Washington, W. Va. Previously he was for 19 years associated with the American Plastics Corp., division of Heyden Newport Chemical Co., where he had been in charge of injection and compression molding.

Charles L. Novak has been named a sales representative with the New York sales staff of Titanium Pigment Corp., a subsidiary of National Lead Co., headquartering in New York, N. Y. **Thomas T. Wisner** will join the north central sales staff as a sales representative and will serve the Cleveland, O., area. Both of these men joined Titanium Pigment in early 1959 as sales trainees.

Robert G. Francis becomes assistant production manager of the tire division, United States Rubber Co., headquartering at the Detroit, Mich., offices. Formerly factory manager of the company's tire plant at Eau Claire, Wis., he is succeeded in that post by **Clifford W. Chatterson,** formerly production superintendent. **Sanford L. Kruger,** formerly assistant production superintendent, is now production superintendent of the Eau Claire plant.

M. E. Lewis, general manager of the Armour Industrial Chemical Co., Chicago, Ill., has been named a vice president of Armour & Co. by the board of directors. He has been affiliated with Armour & Co. since 1934 and since 1956 has been general manager of the chemical division, which, last June, became part of Armour Industrial Chemical Co.

Bruce Ainsworth has been appointed assistant to **Charles H. Rybolt,** vice president-chemical divisions, for Wallace & Tiernan, Inc. Ainsworth has been assigned to the Harchem division with headquarters in Belleville, N. J. **Howard Abbott** continues as vice president of Harchem. **Jay Quinn,** formerly with the Reading Testing Laboratory, has been appointed associate director of research for Wallace & Tiernan, with responsibility for all Harchem division research activities.


B. Ainsworth Jay Quinn

Robert T. Croysdale has been named vice president, manufacturing, at Anchor Industries, Inc., Cleveland, O., according to **Ben Kravitz,** chairman of the board. Croysdale will serve Anchor Rubber Products and Doan Manufacturing, which are two divisions of Anchor Industries. Previously he had been associated with Ace Rubber Products Corp., Brunswick-Balke-Collender Co., Hewitt-Robins Co., and the molded division of the B. F. Goodrich Co.

Girard E. Pfeil will concentrate on sales-service work in the New York, N. Y., branch sales office for Diamond Alkali Co. He succeeds **Albert C. Munn,** veteran salesman for the firm, whose retirement brings to a close nearly two decades of service. Munn started with Diamond in 1940 as a sales serviceman in the New Jersey area. Since 1950, he has concentrated on sales-service work to Diamond customers in the New York area. Pfeil has been associated with the Diamond sales organization since September, 1957.


Luedeke Studio

E. Campbell L. Hill

Edward C. Campbell has been appointed sales manager of the tire division of Dunlop Tire & Rubber Co., Buffalo, N. Y., according to **J. Michael Billane,** president. A member of the Dunlop sales organization for nine years, Campbell brings to the position 25 years of tire sales and merchandising experience. He succeeds **Lester Hill,** who has been named sales manager of the company's foam rubber products division. Hill will direct the national sales and promotion of Dunlop's complete line of foam rubber cushions, mattresses, and fabricating material.

Gale F. Muchmore has been appointed to the newly created post of manager, rubber and solid-vinyl sales, Mastic Tile Corp. of America. He will coordinate all aspects of national sales of Mastic Tile's rubber and solid-vinyl tile in all sales divisions, working directly with **I. G. Rivers,** vice president in charge of sales, and General Sales Manager **Robert L. Fisher.** Muchmore joined Mastic in 1955 as a sales representative and most recently headed up the products department as manager. He will continue to headquarter at Mastic Tile's Houston, Tex., plant.


R. T. Croysdale F. H. Manley, Jr.

Frank H. Manley, Jr., Pasadena, Calif., has been appointed western area sales-service representative of Falls Engineering & Machine Co., Cuyahoga Falls, O. He will represent Femco in California, Oregon, Washington, Idaho, Montana, Wyoming, New Mexico, Arizona, and Nevada. In charge of the eastern and New England states territory is **Ferd H. Muller,** of Montclair, N. J.; while the east-central representative is **Paul A. Frampton,** of Cuyahoga Falls. Femco builds special machinery, including die cutters and splitters, for the rubber, plastics, textile and other industries.

John G. Ragsdale has been named assistant to **L. A. McQueen,** vice president-sales, The General Tire & Rubber Co., Akron, O. In his new executive assignment, his fifth since joining General Tire in 1948, Ragsdale will work closely in the company in the promotion of both replacement and original-equipment tire sales as well as retaining supervision over the advertising department.

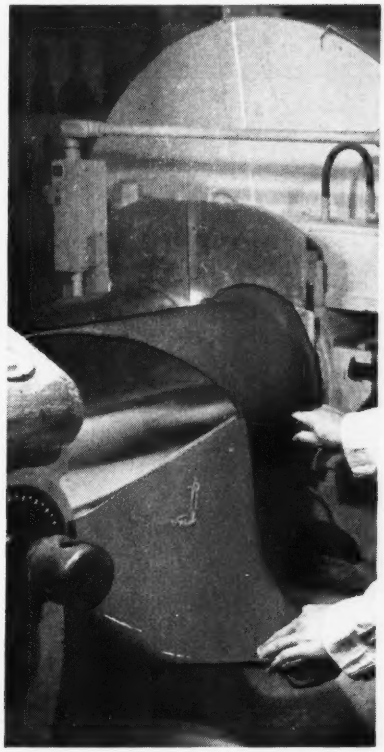
Wilder E. Perkins has been appointed factory manager of the Manhattan Rubber Division, Raybestos-Manhattan, Inc., Passiac, N. J. He previously was co-manufacturing general manager with **R. J. Gorecki,** who recently resigned. Other appointments are: **A. J. Van Benschoten**, director of purchases, and **G. Hellerman,** manager of traffic and transportation.

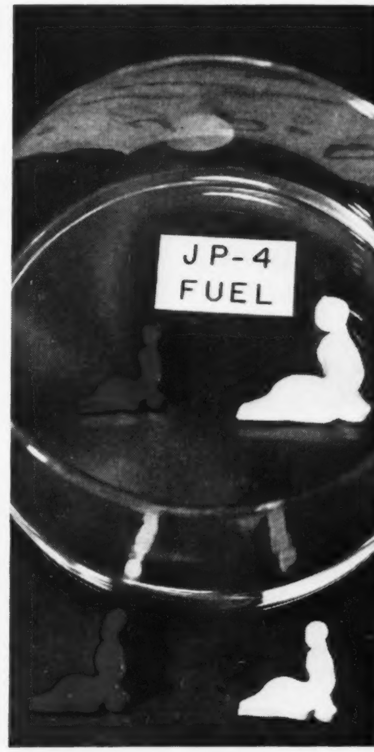
Edward W. Upton, formerly executive vice president of the Refinery Engineering Co., has been elected chairman of the board of directors and chief executive officer of New York Rubber Corp., Beacon, N. Y. Upton, a director of New York Rubber Corp. since 1957, has been with the Refinery Engineering Co., Tulsa, Okla., since 1956.

A. H. Jackson, Jr., has been appointed administrative assistant to R. C. Harrington, production manager of the textile division, United States Rubber Co., with headquarters in Winnsboro, S. C. Jackson previously had been the division's manager of management engineering at Winnsboro.

SILICONE NEWS from Dow Corning

New Base For New Products





SILASTIC® SILICONE RUBBER Solvent-Resistant Masterbatch

For the first time solvent-resistant silicone rubber can be compounded by the rubber fabricator to his exact needs, through the use of new Silastic LS-422 Base. This masterbatch consists of a fluorocarbon silicone polymer and reinforcing silica.

Fuel, oil, and solvent-resistant stocks with hardnesses up to 80 durometer may be formulated from Silastic LS-422 Base. Elongation, tensile strength and other physical properties can be varied. In effect, this new base allows you to tailor-make stocks to meet your customer's requirements. Yet you need inventory only the one masterbatch.

Solvent resistance of stocks compounded from this base is comparable to that of the Dow Corning LS series. The photo at right above shows how little swell results when an extrusion of a stock made from LS-422 base is immersed for 24 hours in JP-4 jet fuel. Note swelling of regular silicone rubber part that was the same size at the start of the test.

Silastic LS-422 base processes easily during compounding . . . bands quickly, doesn't crumble, accepts fillers readily, can be stripped from mill rolls with a knife. Finished stocks can be molded, calendered or extruded. Even the most complex extruded shape is sharp and clear as shown in photo at above right. Write Dept. 9423a for full details.

Sample Recipes and Typical Properties

. . . For 50 Durometer Stock	
Silastic LS-422 Base	100 parts
Luperco CSF or Cadox TS-40	2 parts
Hi Sil X303	8 parts
* Durometer (Shore A)	50
Tensile Strength, psi	1000
Elongation, %	200
% Swell after 77 hrs @ 300 F in ASTM No. 3 Oil	5
. . . For 75 Durometer Stock	
Silastic LS-422 Base	100 parts
Luperco CSF or Cadox TS-40	2 parts
Hi Sil X303	5 parts
Super Neo Navacite	90 parts
* Durometer (Shore A)	75
Tensile Strength, psi	500
Elongation, %	120
% Swell after 77 hrs @ 300 F in ASTM No. 3 Oil	5

* Vulc. 5 min @ 240 F; cured 24 hrs @ 300 F.

Your nearest Dow Corning office is the number one source for information and technical service on silicones.

first in silicones

Dow Corning CORPORATION
MIDLAND, MICHIGAN

ATLANTA BOSTON CHICAGO CLEVELAND DALLAS LOS ANGELES NEW YORK WASHINGTON, D. C.

NEWS from ABROAD

More Soviet Rubber Technology Reported

Keeping up with rubber technology reported in *Kauchuk i Rezina,* the Russian technical journal, is much easier with cover-to-cover English translations now being made by The Research Association of British Rubber Manufacturers. Abstracts of a few of the articles that appeared in No. II, July, 1959, of *Soviet Rubber Technology,* as the new publication is called, are given below. This July issue is a translation of *Kauchuk i Rezina,* February, 1959.

Polymerization

The quantitative relation between the temperature at which butadiene is polymerized in the presence of alkali metals and the structure and properties of the polymer were investigated at the M. V. Lomonosov Institute of Fine Chemical Technology, Moscow. It was found that while raising the temperature from 0 to 120° C., the vinyl group content decreased linearly. The effect was most noted with polymers obtained in presence of lithium and least pronounced with potassium. It was further reported that the glass-transition temperature of polybutadiene shows linear dependence on the concentration of vinyl groups in relation to the number of C_4 units in the main valence chain.

Extrusion Vulcanization

The Scientific Research Institute of the Rubber Industry conducted tests designed to provide a method for continuous vulcanization of rubber tubing or other extrusions in air without pressure. Stocks containing 10 to 20 phr. of ground lime were found to produce non-porous extrusions when extruded at 100 to 110° C. In investigating accelerator combinations it was found that the best results were produced by benzothiazyl disulfide together with zinc dimethyldithiocarbamate or ultra accelerator, P-Extra-N. Substitution of mercaptobenzothiazole for the benzothiazyl disulfide produced as fast a cure, but a greater tendency to scorch. A styrene-butadiene rubber compound was designed that gave smooth extrusions with good shape retension when cured 2-3 minutes at 200° C. by continuous vulcanization in a specially designed vulcanizer.

Improved Drying

A new method is also reported for drying meteorological balloons. A special nozzle circulates heated air within the envelop providing an adequate volume of the heated air efficiently distributed over the interior surface. Controlled removal of the used drying agent is also provided by the device. This method drys balloons 10 to 12 times as fast as air convection ovens, according to the authors, and produces products meeting pilot-balloon and radiosonde cover specifications.

Carrington Is 1959 Hancock Medalist

John Herbert Carrington, technical director, The Anchor Chemical Co., Ltd., Manchester, England, has been named the Hancock Medalist for 1959 and will receive the award at the annual dinner-meeting of the Institution of the Rubber Industry, December 17, at Birmingham, England. He was so honored in recognition of his services to the industry and to the IRI.

Born in Cricklewood, London, in 1904, Carrington was educated at Haberdashers, Aske's, and Southend High School, proceeding to an honors degree in chemistry at East London College (now Queen Mary College), University of London, in 1925. After three years of analytical chemical work in the field of rubber, ebonite, and compounding ingredients at Siemens Bros. & Co., Ltd., he was appointed chemist at Anchor Chemical. The Medalist was named chief chemist in 1930, elected to the board of directors in 1935, and became technical director in 1950. During this time his work has covered the development and evaluation of compounding ingredients for rubber, synthetic rubber and latex, particularly in the fields of carbon black and factice. He serves on the research committees of Research Association of British Rubber Manufacturers and Factice Research & Development Association.

Carrington was elected an Associate of the Royal Institute of Chemistry in 1931 and a Fellow in 1950 and has taken an active part in the work of the local section committee.

In the IRI, he was elected Associate in 1929 and Fellow in 1937. He was a member of the Manchester Section Committee in 1939-44, vice chairman, 1944-46, and chairman, 1946-48. He was a Member of Council for four terms of office between 1944 and 1958 and has served the Institution as a member of the examinations and qualifica-

J. H. Carrington

tions board, the education, executive, and finance committees, and various subcommittees.

Since 1954 he has been one of the examiners for the AIRI Diploma. He has given 10 lectures to various sections of the IRI, taken part on brain trust panels, and presented papers at two rubber conferences.

Malaya Disturbed by Stockpile Sales Plans

The news that the British Government is to dispose of its stockpile of about 100,000 tons of rubber, following on the heels of the American Government's announcement that it plans to sell 470,000 tons out of its huge stockpile, had an understandably disturbing effect on the market in Malaya. As local rubber men pointed out, the total amount of rubber declared surplus—570,000 tons—is equal to 86% of Malaya's entire output in 1958. The immediate effect was a drop in the price of rubber which reached its lowest point on October 5, when for the first time since July 27 the closing price was below one Straits dollar per pound. The price for a while had slipped below the dollar mark on September 25, but recovered somewhat before the day was over. Lately the price has hovered at a level which has been slightly above one dollar.

Local rubber men were prepared for the American move. The British decision, however, seems to have come

as a complete surprise and caused more resentment than otherwise might have been the case. It was termed ill-timed and ill-advised, and the simultaneous actions of the two governments were regarded as proof of a concerted attempt to keep rubber prices down, despite assurances from Washington and London, as well as from the Federation Government, that stockpile rubber would not be disposed of in a way to disrupt world rubber markets. The report that a floor price of about 95 Straits cents is to be fixed below which the British Board of Trade will not sell prompted the skeptical retort that floor prices had a way of becoming ceiling prices.

The Malayan Estate Owners Association took the opportunity once again to urge that a special mission be sent overseas to expand Malaya's rubber trade—this time with a view to softening the blow of the impending stockpile releases.

Despite some acerb opinions, neither in Malaya nor in London is there a disposition to see only the dark side of the matter of stockpile rubber. The *Financial Times* (September 16, 1959) does indeed foresee that price "level will be virtually completely in the hands of the officials in London and Washington, and dealers and consumers will be conducting their operations blindfold," and it stresses that the disposal plans are objectionable because "they create prolonged uncertainties." It believes, however, that the release of some of the Board of Trade stocks in the near future may be helpful. These stocks are thought to consist of high-grade sheet, now especially short on the London market, and some reduction in price level would consequently be welcome to consumers, and to producers also, since the temptation to switch to synthetic rubber would thereby be lessened.

Later (September 28) the paper cited the view of consumers that the present price is excessive and is harmful to them, and in the long run to producers too, "because it encourages extravagant wage demands by plantation workers, and thereby inflation."

The London "Economist" (September 19) points out that the combined release by the United States and Britain, if it should amount to 60,000-65,000 tons a year, would be only 3% of world consumption of natural rubber and less than 2% of consumption of both natural and synthetic rubber. This year the world will use at least 65,000 tons more rubber than it produces, it adds.

Certain rubber experts in Malaya, who foresee the price dropping to 90-95 Straits cents per pound for a while, look for resulting long-term benefits to the industry. Smallholders, it is pointed out, are reluctant to replant as long as the rubber price is above one dollar; a lower price might encourage them to extend their replantings. Estates might be similarly moved to intensive replanting, and with the right kind of effort they would eventually find themselves in a position to sell rubber cheaply and thus stem the synthetic rubber tide.

We note also that an official of a leading Chinese firm expressed the opinion that America had to protect her own interest and that, on the whole, he felt that the stockpile decision was fair.

High-Yield NR Trees Replanted in Malaya

Currently the average yield of natural rubber in Malaya is 490 pounds per year per acre. Also, some 80,000 acres of estate rubber and 70,000 acres of smallholder rubber are being replanted with stocks that six years hence will bring in from 1,500 to 2,000 pounds per year per acre. This is a trend of production modernization that has been constantly on the rise since 1947, when estates planted some 26,000 acres and smallholders some 4,500 acres in high-yielding stocks, according to information from the Natural Rubber Bureau, Washington, D. C., U.S.A.

In the past 12 years, not only has there been a great increase in the acreage put into high-production trees, but the yield of the new rubber has also been multiplied. At the Rubber Research Institute, Kuala Lumpur, Malaya, scientists have done amazing work in upping the yield of the rubber tree. In test-tube stage now are stocks which, it has been found, can bring as much as 25,000 pounds per year per acre.

With expected yields for future natural rubber three and four times today's average, the natural rubber industry by using such plantings is in the same position as a synthetic rubber factory that by means of the latest machinery is able to up production without materially adding to labor costs. This means that natural rubber will be in an increasingly better position to compete price-wise with its synthetic competitor.

About 1.2 million acres, approximately one-third of Malaya's total 3.5 million acres of rubber, are replanted and new-planted with high-yielding stocks. Last year some 70,000 acres of smallholder rubber were replanted, more than 15 times as much as the 4,400 acres replanted only 10 years ago.

With American industry leaders forecasting that by 1965 world consumption of all rubber could run to upwards of 4.5 million tons as opposed to current consumption of approximately 3.55 million tons, the optimism of Malayan replanters in the future would seem to be justified.

Pelletized News

THE FIRESTONE TIRE & RUBBER CO., Akron, O., will establish a multimillion-dollar manufacturing operation in France, including a tire production plant. Firestone, who has long been distributing tires in France, is establishing the facilities to meet the rapidly expanding needs of the country. The firm plans to build on the same site a plant for the manufacture of special synthetic latices and copolymers of butadiene and styrene. The firm will manufacture a full line of tires and tubes for passenger cars, trucks, buses, farm equipment, motorcycles, and scooters. The location for the plant will be chosen in the near future. Plans are complete, and construction will begin after the site is selected. The tire plant will go into production late in 1960.

A new Montecatini 30,000-metric-ton-per-year ethylene plant, engineered by The M. W. Kellogg Co., New York, N. Y., U.S.A., and Kellogg International Corp., London, England, has been placed on stream in Ferrara, Italy. It is Montecatini's second ethylene plant there. The new unit is designed to produce 30,000 metric tons annually of high-purity ethylene products and 15,000 metric tons per year of high-purity propylene from the pyrolysis of light naphtha or from the pyrolysis of heavy naphtha. The propylene produced at the new Ferrara unit will go into the production of Montecatini's new "Moplen" isotactic polypropylene plastics, fibers, and elastomers.

ARTHUR D. LITTLE, INC., Cambridge, Mass., this month will open an office in Zurich, Switzerland, according to Raymond Stevens, president. The move is another step in the research company's international expansion program to serve United States industry with overseas interests. The new Zurich office will be headed by Alexander Bogrow, who has been in charge of A.D.L. work in the economics of the petroleum and mining industries. He will be assisted by Richard A. Stephan, recently a member of the firm's New York branch.

The automobile tire factory being built in Melbourne, Victoria, for B. F. Goodrich (Australia) Pty. Ltd., is expected to go into operation in January, 1960, two months ahead of schedule. The B. F. Goodrich Co., Akron, O., U.S.A., has a controlling interest in the Australian company, and Ampol Petroleum Ltd., a 43% interest.

CEYLON's rubber export duty, which had been reduced from 28 cents (rupee) to 20 cents in July, 1958, was again brought back to the 28-cent level, effective September 10, 1959.

News from Abroad

F. B. Norton

FRANK B. NORTON, who has been sales manager of the Firestone International Co., becomes manager of the United States Trading Co., Monrovia, Liberia, according to **B. H. Larabee,** president of the Firestone Plantations Co. The USTC, a subsidiary of The Firestone Tire & Rubber Co., is a general merchandising organization in Liberia, with sales outlets in the Firestone plantations area and a wholesale division in Monrovia. In his new position Norton, who joined Firestone in 1947, will be in charge of all USTC operations in Liberia and will report to **A. G. Lund,** president of USTC.

OH EU KOK, of Penang, is to get a year's training at the central engineering department of United States Rubber Co., in New York, N. Y., U.S.A., under a full grant from Malayan American Plantations, Ltd. Oh Gim Hock, the father of young Mr. Oh, is on the staff of *Malayan American* and for a number of years has supplied Malayan news to RUBBER WORLD.

THE NORTHWESTERN RUBBER CO., LTD., Liverpool, England, following change of ownership of the majority of its shares, announced that the board has been reconstituted, and John Riddel and L. V. D. Tindale have been elected directors. The new board intends to continue improve, and extend the range of activities, and arrangements are already being made to implement this policy. After an association of 52 years with the company, A. Nourry has retired as managing director, but his services are being retained as consultant. He is succeeded by Wilfred Murray.

JAPAN'S consumption of natural rubber during 1958 amounted to 126,170 tons, against 130,345 tons the year before. According to the Japan Rubber Manufacturers' Association, the output of rubber goods last year totaled 143,000 tons, and exports, 20,000 tons. Estimates of output of rubber goods for 1959 come to 152,000 tons, of which 22,000 tons are expected to be exported. The exports would include 13,000 tons of automobile tires and tubes (out of 50,000 tons produced), it is thought, besides 1,850 tons of rubber footwear (out of a total of 25,100 tons produced).

MARKET REVIEWS

Natural Rubber

The atmosphere of insecurity and confusion in the natural rubber market still prevails, although the intentions of the United States and British governments in regard to their stockpiles of natural rubber have been announced. It has been stated that every effort will be made to avoid disruptions of the market, but it is difficult to visualize how 570,000 tons of rubber can be disposed of without having a pronounced effect on the price. It is likely that the G.S.A. and the B.O.T. will for some considerable time be the dominating factors in the world's rubber markets. The G.S.A. said that sales of stockpiled rubber will be negotiated by telephone on the basis of prevailing market prices.

Demand for natural rubber in 1959 will approximate some 40,000 tons over supply, according to the Natural Rubber Bureau. This report indicated a continuance of the short-supply trend for natural rubber which was evident for the past several years. More natural rubber will be consumed than will be produced during the year, with a consequent reduction in world stocks, NRB said. Against 1958 usage of 1,982,500 tons, 1959 world demand is approximated at 2,050,000 tons, with only 2,010,000 tons to fulfill the need, putting the drain on stocks at some 40,000 tons.

Japan will consume 165,000 tons of natural rubber in 1960, according to K. Hashimoto, rubber chief of Kasho Co., Ltd. He also predicted that demand for natural rubber will continue to increase considerably over the coming years. He added that the release of stockpile rubber by the United States and Britain need not cause rubber traders in Malaya and Singapore too much anxiety. Trade sources pointed out that British and United States releases of rubber would total less than 5% of world natural rubber consumption.

September sales, on the New York Commodity Exchange, [totaled] 15,490 tons, compared with 15,270 tons for August contract. There were 21 trading days in September, and 21 during the September 16—October 15 period.

On the physical market, there were few daily sellers' prices reported for the period under review, and for this reason we do not report any averages of sellers' prices, as has heretofore been our policy.

Synthetic Rubber

A new monthly high for production of synthetic rubber was established with 119,777 long tons for September, as compared with the previous peak of 119,031 long tons recorded in August, 1959, according to the monthly report of The Rubber Manufacturers Association, Inc.

Consumption of new rubber in the United States for September amounted to 146,128 long tons, against 137,951 long tons consumed during August. Consumption of all types of synthetic rubber in September was 96,546 long tons, contrasted with August's consumption of 91,037 long tons.

Consumption by type in September, as compared with August usage, in long tons, increased in all types except for nitrile, as follows: SBR, 79,533, against 75,340; neoprene, 7,320, against 7,117; butyl, 6,759, against 5,533; and nitrile, 2,934, against 3,047.

Exports for all types increased to 30,865 tons in September from 23,532 tons in August.

Trends in SBR masterbatches showed the oil-black masterbatch production up to 19,425 from 18,042 tons in August. Carbon black masterbatches in contrast dropped to 5,034 tons in September from 5,611 tons in August. The oil-extended rubber production showed an increase to 28,217 tons in September from 25,933 tons in August.

Total new rubber consumption for the nine-month period reached 1,220,820 long tons, of which 799,484 long tons were synthetic.

Scrap Rubber

Scrap rubber market activity continued in a routine vein during the period under review, according to one source. Tires again saw a fair amount of action, and potential inner-tube buyers were putting in an appearance during the latter part of September. Tube prices maintained their recent mild improvement. Both in the East and at Midwest points synthetic butyl tubes registered 5.50¢, and mixed auto tubes still figured at 4.00¢.

	Eastern Points	Akron, O.
	Per Net Ton	
Mixed auto tires	$7.00	$12.50
S.A.G. truck tires	nom.	17.00
Peeling, No. 1	nom.	26.00
2	nom.	22.00
3	nom.	19.00
Tire buffings	nom.	nom.
	(¢ per Lb.)	
Auto tubes, mixed	4.00	4.00
Black	5.75	5.75
Red	6.25	6.25
Butyl	5.50	5.50

Latex

Supplies of drummed latex during the September 16-October 15 period became increasingly difficult to obtain,

REX CONTRACT

	Sept. 18	Sept. 25	Oct. 2	Oct. 9	Oct. 16
Sept.	36.40	....	....	....	....
Nov.	35.70	44.00	37.25	37.40	37.10
1960					
Jan.	34.40	35.75	34.35	34.40	34.70
Mar.	33.65	33.85	33.60	33.85	33.97
May	33.20	33.40	33.10	33.30	33.25
July	32.80	32.90	32.85	33.05	33.00
Sept.	32.50	32.55	32.60	32.83	32.75
Nov.	....	32.25	32.40	32.60	32.50

NEW YORK OUTSIDE MARKET

	Sept. 18	Sept. 25	Oct. 2	Oct. 9	Oct. 16
RSS #1	39.50	*	*	40.25	41.00
#2	39.25	*	*	39.75	40.75
#3	37.00	*	*	39.25	40.25
Pale Crepe					
#1 Thick	43.00	*	*	45.50	46.50
Thin	42.00	*	*	44.50	45.50
#3 Amber					
Blankets	*	*	*	37.75	37.75
Thin					
Brown Crepe	*	*	*	37.38	37.63
Standard Flat					
Bark	*	*	*	35.50	35.50

* Owing to erratic market conditions due to world shortages there were no prices available for these grades.

Tests prove the definite superiority of improved Polysar Krynacs

Per Cent Yellowness of Oil Resistant Rubbers				
Rubber	Staining (Lacquer exposed)		Discolouration (Rubber exposed)	
	Absolute	Relative	Absolute	Relative
Original Polysar Krynac 800	**36.0**	**100**	**75.9**	**100**
Competitive nitrile rubber "A"	52.6	146	76.8	101
Competitive nitrile rubber "B"	52.2	145	83.8	110
Competitive nitrile rubber "C" most recently announced	**31.6**	**88**	**74.5**	**98**
IMPROVED KRYNAC SERIES	**19.2**	**53**	**68.2**	**90**

The yellowness figures in the above chart were determined by testing improved Polysar Krynacs along with original Polysar Krynac 800 and three competitive nitrile rubbers in a simple white compound.

$$\text{Relative Yellowness} = \frac{\text{Yellowness of Rubber}}{\text{Yellowness of Krynac 800}} \times 100$$

They show:

1. The superiority of the original Polysar Krynacs 800, 801, 802 and 803 over two standard competitive grades in discolouration and staining after sun-lamp exposure.

2. The striking improvement of the current Polysar Krynac series in discolouration and staining under sun-lamp exposure, not only over the original Polysar Krynac 800-3 series, but also over the most recently announced competitive nitrile rubber.

3. The reduction of yellowing of adjacent light coloured finishes to one-half of that experienced with the original Polysar Krynac series; to one-third of yellowing caused by standard competitive grades, or by almost one-third over the newest competitive grade.

Write our Marketing Division for full information about the new Polysar Krynacs.

POLYMER CORPORATION LIMITED · SARNIA, CANADA

it was reported, as hardly anything was available for shipment until November. With a reasonable demand reported for this period, it seems that the present overall tightness will continue, and that the recent improvement in the price differential will be maintained.

A similar situation prevails in the bulk market which is very steady. Bulk latex producers are said to be well sold up to and including March of next year.

Shipments of natural latex from Malaya in August totaled 11,505 tons, against 9,762 tons in July, according to one source. Some 2,760 tons were shipped to the United Kingdom, and 3,068 to the United States, compared with 2,833 and 2,620 tons, respectively, in the previous month.

Prices for ASTM centrifuged concentrated natural latex, in tank-car quantities, f.o.b., rail tank car, ran about 41.74¢ per pound solids. Synthetic latices prices were 26.0 to 40.25¢ for SBR; 37 to 57¢ for neoprene; and 45 to 60¢ per pound for the nitrile types.

(All Figures in Long Tons, Dry Weight)

Type of Latex	Production	Imports	Consumption	Month-End Stocks
Natural				
July	0	5,469	5,004	10,752
Aug.	0	*	6,613	11,472
SBR				
July	6,871	....	5,804	6,983
Aug.	8,225	....	7,348	6,775
Neoprene				
July	956	0	919	1,528
Aug.	1,242	0	961	1,576
Nitrile				
July	1,279	0	940	2,761
Aug.	1,258	0	1,116	2,779

* Not available yet for period covered.

Reclaimed Rubber

One reclaimer in the Midwest reported that business remained quite good during the September 16-October period, and current orders on hand indicated a fairly good month (October). This source felt, however, that the reclaim business would be even better if the steel industry could get its labor problems settled.

Another reclaimer reported that its sales continued at high levels during the period under review. The depleted inventories of three large tire producers resulting from the recent two-month rubber industry strike were being replenished. This development, of course, affected reclaim consumption favorably. Sales for the first eight months of 1959 exceeded the corresponding period in 1958 by more than 20%. This source also reported that, owing to the steel strike, there were indications of customer curtailment toward the end of this period.

According to The Rubber Manufacturers Association, Inc., report, September production of reclaimed rubber was 28,300 long tons; while consumption was 24,790 long tons.

Reclaimed Rubber Prices

Whole tire, first line	$0.11
Third line	.1025
Inner tube, black	.16
Red	.21
Butyl	.14
Light carcass	.22
Mechanical, light-colored, medium gravity	.155
Black, medium gravity	.085

The above list includes those items or classes only that determine the price basis of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity, at special prices.

Rayon and Nylon

The member companies of the Tyrex group were continuing to increase their production of Tyrex viscose cord during the September 16-October 15 period with the objective of supplying more of the cord for the replacement-tire market, it was reported. For the first months that Tyrex cord was on the market, all of it was used for 1959 original-equipment tires. Large amounts of it are again being used for 1960 original-equipment tires, and this action necessarily limits the amount of cord available for the replacement market, according to trade sources.

With each of the member companies, however, converting more and more of its present production to the new Tyrex viscose cord, it has now become possible for tire manufacturers to use this increased supply to make tires for the replacement market, it was reported. Some, if not all of the member companies, still continue to produce the regular types of rayon tire cord to a degree, since some less expensive tires still use the lower strength cords.

Successive price reductions by nylon tire cord producers and by rayon tire cord producers have resulted in what appears to be a stalemate. The most popular rayon now is priced at 62¢ a pound, and the most popular nylon is priced at $1.06 a pound. Translating this into cost of pounds actually used in tire construction (accepting the statement made by some cord producers that one pound of nylon does the work of 1.7 pounds of rayon), there is less than one penny difference in price.

The trend to nylon continues strong in a very good tire-replacement market. Estimates of replacement-tire sales this year peg the total at more than 66 million units, and about 40% of these will be made with nylon cord.

Total packaged production of rayon and acetate filament yarn during September was 63,000,000 pounds, consisting of 29,100,000 pounds of high-tenacity rayon yarn and 33,900,000 pounds of regular-tenacity rayon yarn. Production for August had been: total, 63,100,000 pounds, including regular-tenacity rayon yarn, 34,000,000 pounds, and high-tenacity rayon yarn, 29,100,000 pounds.

Filament yarn shipments for September to domestic consumers totaled 58,700,000 pounds, of which 26,600,000 pounds were high-tenacity rayon yarn, and 32,100,000 pounds were regular-tenacity rayon yarn. Shipments for August had been: total 63,600,000 pounds; high-tenacity, 28,700,000 pounds; regular-tenacity, 34,900,000 pounds.

Rayon Prices

Tire Fabrics

1100/490/2	$0.625/$0.78
1650/908/2	.685
2200/980/2	.655

Tire Yarns

High-Tenacity	
1100/ 490, 980	.62/ .66
1100/ 490	.62/ .66
1150/ 490, 980	.59/ .63
1165/ 480	.59/ .66
1230/ 490	.59/ .63
1650/ 720	.55/ .60
1650/ 980	.55/ .58
1875/ 980	.55/ .58
2200/ 960	.54/ .57
2200/ 980	.54/ .57
2200/1466	.64
4400/2934	.60
Super-High Tenacity	
1650/ 720	.55/ .60
1900/ 720	.58

Nylon Prices

Tire Yarns

840/140	1.06
1680/280	1.03

Industrial Fabrics

On the surface the industrial grey cotton cloth market during the September 16-October 15 period was quiet. Volume buying was lacking, but this condition was viewed as perfectly normal by the trade in view of the unsettled labor situation. Buyers kept mills somewhat busy, however, insisting on their maintaining scheduled deliveries agai nst contracts. Adding to this problem of delivery were requests calling for earlier shipments, such as getting November yardage during October.

The small-quantity buying indicated not only that buyers have allowed inventories to decline sharply, but that caution marks operations. Once the strikes, present and lurking, are decided, the industrial grey goods inventories will begin being filled through sales contracts. Such replenishments are intended to build up mills' January forward order books, it was reported.

There has been a trend to higher prices. While, so far, it applies to very few constructions and only to what is much wanted, advances have been effected and paid. Osnaburgs are a case in point. From a half to a cent a yard

(*Continued on page 298*)

Synthetic Rubbers and Latices*

Monomers

11-80, 100, 200, 112-3 Triols *lb.*	$0.255	
11-300 *lb.*	.265	
-400 *lb.*	.325	
Acrylonitrile *lb.*	.27	
Butadiene *lb.*	.15	
Dow Styrene *lb.*	.12	
H99, N99 *lb.*	.205	
RG *lb.*	.17	
Vinyltoluene *lb.*	.17	
EGD *lb.*	1.75	/ $2.00
Hylene M *lb.*	1.25	/ 2.75
M-50 *lb.*	.86	/ 2.36
T *lb.*	.90	/ 2.46
TM *lb.*	.75	/ 2.31
-65 *lb.*	.80	/ 2.36
Isobutylene *gal.*	.38	
Isoprene *lb.*	.25	
Mondur-C *lb.*	1.05	
Multron R-2 *lb.*	.54	
P200 *lb.*	.23	
Rohm & Haas ethyl acrylate *lb.*	.34	/ .36
Glacial methacrylic acid *lb.*	.40	/ .425
Methyl acrylate *lb.*	.37	/ .39
Methacrylate *lb.*	.29	/ .31

Shortstops

4P Mercaptan *lb.*	.27	/ .31
DDM *lb.*	.94	/ .975
Mercaptan 174 *lb.*	.38	/ .50
Sharstop 204 *lb.*	.38	/ .42
268 *lb.*	.52	/ .53
Tecquinol *lb.*	.825	/ .845
Thiostop K *lb.*	.50	/ .53
N *lb.*	.38	/ .47
Vulnapol KM *lb.*	.52	/ .56
NM *lb.*	.38	/ .42
Wingstop B *lb.*	.38	

Acrylic Types

Acrylon BA-15 *lb.*		1.25[a]
EA-5 *lb.*		1.00[a]
Hycar 4021	1.34[c]	/ 1.35[c]

Latices

Hycar 2600X30, 2600X39, 2601 *lb.*	.50	/ .56

Butadiene Types (BR†)

Cis-1 *lb.*	.35[b]	/ .50[b]

Cold BR Latex

Pliolite Latex 2104		.325

Fluorocarbon Types

Kel-F Elastomer *lb.*	15.00	/ 16.00
5500, 820 (Latex) *lb.*	15.00	/ 17.15
Viton A, AHV *lb.*	10.00	
B *lb.*	13.00	

Isobutylene Types

Enjay Butyl 035, 065, 150, 215, 217, 218		.23[a]
165, 268, 325, 365		.24[a]
Hycar 2202	.65[c]	/ .75[c]
Polysar Butyl 100, 200, 300 400		.245[c]
101		.2775[a]
301		.255[c]
Vistanex LM		.45[a]
MM		.35[a]

Neoprene Types (CR)

Neoprene Type AC, AD, CG	.55[a]	/ .575[a]
FB	.65[a]	/ .675[a]
GN, GN-A, WX	.41[a]	/ .435[a]
GRT, S	.42[a]	/ .445[a]
KNR	.75[a]	/ .775[a]
W, WHV	.39[a]	/ .415[a]
WRT	.45[a]	/ .475[a]

Latices

Neoprene Latex 571, 842-A	.37[a]	/ .47[a]
572	.39[a]	/ .49[a]
60, 601-A	.40[a]	/ .50[a]
635	.41[a]	/ .51[a]
650	.42[a]	/ .52[a]
735, 736	.38[a]	/ .48[a]
750	.39[a]	/ .49[a]
950	.47[a]	/ .57[a]

Nitrile Types

Butaprene NF		.49[b]
NH		.65[b]
NL		.50[b]
NXM		.58[b]
Chemigum, N1NS		.64[b]
N3NS, N5		.58[b]
N6, N-6B, N7, N8		.50[b]
N600		.50[b]
Hycar 1001, 1041	$0.58[c]	/ $0.59[a]
1002, 1042, 1043, 1052, 1053, 1312	.50[c]	/ .51[c]
1014	.60[c]	/ .61[c]
1072	.64[c]	/ .65[c]
1411	.62[c]	/ .63[c]
1432, 1441	.59[c]	/ .60[c]
Paracril, AJ	.485[c]	/ .495[c]
B, BJ, BJLT, BLT	.50[c]	/ .51[c]
C, CLT	.58[c]	/ .59[c]
CV	.59[c]	/ .60[c]
D	.65[c]	/ .66[c]
OZO	.46[c]	/ .47[c]
18-80	.60[c]	/ .61[c]
Polysar Krynac 800, 802, 803		.50[c]
801		.58[c]

Latices

Butaprene N-300		.46[b]
N-400, N-401		.54[b]
Chemigum 200		.49[b]
235 CHS, 236		.54[b]
245 B, 245 CHS, 246, 247, 248		.46[b]
Hycar 1512, 1552, 1562, 1577	.45[c]	/ .52[c]
1551, 1561, 1571	.53[c]	/ .60[c]
1852	.46[c]	/ .52[c]
Nitrex 2612	.45[a]	/ .52[a]
2616	.53[a]	/ .60[a]
2619	.52[a]	/ .59[a]
2620, 2625	.45[a]	/ .52[a]
Tylac 640	.45[c]	/ .52[c]
740	.49[c]	/ .56[c]
840	.53[c]	/ .60[c]
1640	.54[c]	/ .61[c]

Polyethylene Type

Hypalon 20, 30 *lb.*	.70	/ ..7275

Polysulfide Types

Thiokol LP-2, -3, -31, -32, -33		.96[a]
-8		1.35[a]
-205		4.00[a]
Type-A		.50[a]
FA		.69[a]
ST		1.25[a]

Latices

Thiokol Latex (dry wt.)		
Type MX		.80[a]
WD-2		1.25[a]
-6	.80[a]	/ 1.25[a]

Silicone Types

GE (compounded)	2.29[c]	/ 4.90[c]
Silicone gum (not compounded)	3.85[c]	/ 4.55[c]
Silastic (compounded)	2.95[b]	/ 3.50[b]
(Partly compounded)	3.15[b]	/ 3.60[b]
(Uncompounded)	4.05[b]	/ 4.35[b]
LS-53	16.00	/ 22.00
Union Carbide (compounds)	2.35[b]	/ 3.20[b]
(Gums)	3.85[b]	/ 4.25[b]

Styrene Types

Hot SBR‡

Ameripol 1000, 1001, 1006, 1007	.24[c]	/ .247[c]
1002	.2435[c]	/ .2495[c]
1006 Crumb	.2475[c]	/ .2535[c]
1009	.2475[c]	/ .2535[c]
Crumb	.259[c]	/ .265[c]
1011	.2475[c]	/ .2535[c]
1012	.2425[c]	/ .2485[c]
Crumb	.249[c]	/ .255[c]
1013	.241[c]	/ .247[c]
Crumb	.2615[c]	/ .2675[c]
ASRC 1004, 1006	.241[c]	/ .2475[c]
1009	.2475[c]	/ .2535[c]
1018	.27[c]	/ .276[c]
1019	.265[c]	/ .271[c]
Copo 1006	.241[c]	/ .247[c]
FR-S 1000, 1001, 1004, 1006	.241[c]	/ .247[c]
1007	.241[c]	/ .247[c]
1009	.2475[c]	/ .2535[c]
1010	.26[c]	/ .266[c]
1012	.2425[c]	/ .2485[c]
1013	.241[c]	/ .247[c]
Crumb	.2615[c]	/ .2675[c]
1014	.281[c]	/ .287[c]
141	.28[c]	/ .286[c]
181	.241[c]	/ .247[c]
Naugapol 1016, 1019	.265[b]	/ .27[b]
1018	.27[b]	/ .275[b]
1021	.30[b]	/ .305[b]
1022	.295[b]	/ .30[b]
1023	.315[b]	/ .32[b]
6003	.27[b]	/ .275[b]
Philprene 1000, 1001, 1006, 6701	.241[b]	/ .247[b]
1009	.2475[b]	/ .2535[b]
1018	.27[b]	/ .276[b]
1019	.265[b]	/ .271[b]
Plioflex 1006	.241[c]	/ .247[c]
Polysar S-630	.241[c]	/ .247[a]
S-X-371	.255[c]	/ .261[c]
S-1000, -1006, -1013		.23[a]
-1002, -1011		.2325[a]
-1009		.24[a]
Synpol 1000, 1001, 1006, 1007, 1061	.241[b]	/ .247[b]
1002	.2435[b]	/ .2495[b]
1012	.2425[b]	/ .2485[b]
1009	.2475[b]	/ .2535[b]
8000	.241[b]	/ .247[b]
X-274	.255[c]	/ .261[c]

Hot SBR Black Masterbatch

Philprene 1100		$0.194
1104		.190[b]
S-1100		.185[a]

Hot SBR Latices

FR-S 2000, 2001	$0.2725[c]	/ .3425[c]
2002	.35[c]	/ .36[c]
2003, 2004	.305[c]	/ .36[c]
2006	.29[c]	/ .382[c]
Naugatex 2000, 2001	.2775[a]	/ .3575[a]
2002	.30[a]	/ .37[a]
2006	.29[a]	/ .42[a]
Pliolite Latex 2000, 2001		.2825[c]
2076		.295[c]
Polysar Latex II		.29[c]
IV		.2775
S-2000, 2006		.26[a]

Cold SBR

Ameripol 1500, 1501, 1502, 4600	.241[c]	/ .247[c]
ASRC 1500, 1502	.241[c]	/ .247[c]
1503	.2625[c]	/ .2685[c]
3105, 3106	.241[c]	/ .247[c]
3110	.26[c]	/ .266[c]
C-102		.23[a]
Copo 1500, 1502	.241[c]	/ .247[c]
1505	.261[c]	/ .267[c]
FR-S 1500, 1502, 146, 179	.241[c]	/ .247[c]
127	.26[c]	/ .266[c]
Gentro 1500		.241
Naugapol 1503	.2625[b]	/ .2675[b]
1504	.33[b]	/ .335[b]
6100	.31[b]	/ .315[b]
Philprene 1500, 1502	.241[b]	/ .247[b]
1503	.2625[b]	/ .2685[b]
Plioflex 1500C, 1502, 1507, 1508X	.241[c]	/ .247[c]
Polysar Kryflex 200		.251[c]
252		.27[c]
Krylene NS		.241[a]
SS-250, SS-250-Flake		.2875[a]
S-1500, S-1502		.23[a]
1509		.23[a]
Synpol 1500, 1502, 1551	.241[b]	/ .247[b]

Cold SBR Black Masterbatch

Ameripol 4650	.182[c]	/ .188[c]
4651	.177[c]	/ .183[c]
4652	.1425[c]	/ .1485[c]
4654	.187[c]	/ .193[c]
4655	.182[c]	/ .188[c]
Baytown 1600, 1601, 1602		.193[b]
CB-102		.185[a]
Gentro-Jet 9152		.208
9153		.182
9154		.1845
Philprene 1601	.193[b]	/ .199[b]
1603	.194[b]	/ .200[b]
1605	.19[b]	/ .196[b]
S-1600, -1602		.1825[a]
-1605		.18[a]
Synpol 8150	.193[b]	/ .199[b]
8151	.182[b]	/ .186[b]

Cold SBR Oil Masterbatch

Ameripol 1705	.2035[c]	/ .2095[c]
1707, 1708	.191[c]	/ .197[c]
1710, 1712	.1885[c]	/ .1945[c]
4700	.175[c]	/ .181[c]
4701	.1725[c]	/ .1785[c]
ASCR 1703	.206[c]	/ .212[c]
1708	.191[c]	/ .197[c]
1712	.1885[c]	/ .1945[c]
1713	.175[c]	/ .181[c]
Carbomix 3750	.182[c]	/ .188[c]
3752	.1845[c]	/ .1905[c]
3754	.177[c]	/ .183[c]
Copo 1712	.1885[c]	/ .1945[c]
1773	.206[c]	/ .212[c]
1778	.191[c]	/ .197[c]
3900	.231[c]	/ .237[c]
FR-S 1703	.206[c]	/ .212[c]
1710	.1885[c]	/ .1945[c]
1712	.1885[c]	/ .1945[c]
123	.196[c]	/ .202[c]
154, 155	.1885[c]	/ .1945[c]
173	.206[c]	/ .212[c]
178	.191[c]	/ .197[c]
Gentro 1712		.1885
Philprene 1703	.206[b]	/ .212[b]
1708	.191[b]	/ .197[b]
1712	.1885[b]	/ .1945[b]
Plioflex 1703, 1773	.206[c]	/ .212[c]
1710C, 1712C	.1885[c]	/ .1945[c]
1713	.175[c]	/ .181[c]
1714C	.1725[c]	/ .1785[c]
1773	.206[c]	/ .212[c]
1778	.191[c]	/ .197[c]
Polysar Krynol 651		.1885[c]
652		.191[c]
S-1703		.195[a]
-1707		.18[a]
-1709, -1712		.1775[a]
-7701		.185[a]
Synpol 1703	.206[b]	/ .212[b]
1707, 1708	.191[b]	/ .197[b]
1711	.19[b]	/ .196[b]
1712	.1885[b]	/ .1945[b]
8200	.191[b]	/ .197[b]
8201	.175[b]	/ .181[b]
8202 *lb.*	.1725[b]	/ .1785[b]

(*Continued on page 298*)

[a] Freight extra.
[b] Minimum freight allowed.
[c] Freight prepaid.
* Prices are per pound carload of tank-car dry weight unless otherwise specified.
† BR—Butadiene rubber.
‡ SBR—Styrene-butadiene rubber.

Compounding Ingredients*

Abrasives

Pumicestone, powdered	lb.	$0.0363/	$0.065
Rottenstone, domestic	lb.	.03 /	.04
Shelblast	ton	80.00 /	165.00
Walnut Shell Grits	ton	50.00 /	160.00

Accelerators

A-1 (Thiocarbanilide)	ton	.50 /	.57
A-32	ton	.66 /	.80
A-100	lb.	.52 /	.66
Accelerator 49	lb.	.59 /	.60
52	lb.	1.14	
57, 62, 67, 77	lb.	1.04	
66	lb.	4.25	
89	lb.	1.20	
108	lb.	.92	
552	lb.	2.25	
808	lb.	.66 /	.68
833	lb.	1.17 /	1.19
Altax	lb.	.54 /	.56
Arazate	lb.	2.25	
Beutene	lb.	.66 /	.68
Bismate	lb.	3.00	
B-J-F	lb.	.27 /	.32
Butasan	lb.	1.04	
Butazate	lb.	1.04	
Butyl Accelerator Eight	lb.	1.35	
Namate	lb.	.45 /	.50
Zimate	lb.	1.04	
Ziram	lb.	.89 /	1.04
Captax	lb.	.44 /	.46
Conac S	lb.	.76 /	.78
C-P-B	lb.	1.95	
Cumate	lb.	1.45	
Cydac	lb.	.70 /	.73
Cyuram DS, powder	lb.	1.14	
Pellets	lb.	1.14	
MS, powder	lb.	1.14	
Pellets	lb.	1.14	
Cyzate B, E	lb.	.85 /	.89
Delac-S	lb.	.71 /	.73
Dibs	lb.	.85	
Dipac	lb.	.85	
DOTG (diorthotolylguanidine)			
Cyanamid	lb.	.69 /	.70
Du Pont	lb.	.69 /	.70
DPG (diphenylguanidine)			
Cyanamid	lb.	.49 /	.50
Monsanto	lb.	.52 /	.58
El-Sixty	lb.	.62 /	.64
Ethasan	lb.	1.04	
Ethazate	lb.	1.04	
50-D	lb.	.87 /	.89
Ethyl Seleram	lb.	3.00	
Thiurad	lb.	1.04	
Thiuram	lb.	1.04	
Tuads	lb.	1.04	
Tuex	lb.	1.04	
Zimate	lb.	1.04	
Ziram	lb.	.89 /	1.04
Ethylac #650	lb.	.93 /	.95
Guantal	lb.	.60 /	.67
Hepteen Base	lb.	1.85	
Ledate	lb.	1.04	
MBT (2-mercaptobenzothiazole)			
American Cyanamid	lb.	.44 /	.46
Du Pont	lb.	.44 /	.46
Naugatuck	lb.	.44 /	.49
-XXX, Cyanamid	lb.	.55 /	.57
MBTS (mercaptobenzothiazyl disulfide)			
Cyanamid	lb.	.54 /	.56
Du Pont	lb.	.54 /	.56
Naugatuck	lb.	.54 /	.56
-W Cyanamid	lb.	.59 /	.61
Merac #225	lb.	.75 /	1.05
Mertax	lb.	.55 /	.57
Methasan	lb.	1.04	
Methazate	lb.	1.04	
Methyl Thiuram	lb.	1.14	
Tuads	lb.	1.14	
Zimate	lb.	1.04	
Monex	lb.	1.14	
Mono-Thiurad	lb.	1.14	
2-MT (2-mercaptothiazoline)			
Cyanamid	lb.	.88 /	.90
Du Pont	lb.	1.00	
NA-22	lb.	1.05	
NOBS No. 1	lb.	.70 /	.78
Special	lb.	.74 /	.82
O-X-A-F	lb.	.55 /	.57
Pennac SDB	lb.	.45 /	.48
Pentex	lb.	1.24	
Flour	lb.	.30	
Permalux	lb.	2.25	
Phenex	lb.	.52 /	.59
Pip-Pip		2.07	
Polyac Pellets	lb.	1.85	
R-2 Crystals	lb.	4.35	
Rotax	lb.	.55 /	.57
RZ-50, -50B	lb.	1.00	
S.A. 52	lb.	1.14	
57, 62, 67, 77	lb.	1.04	
66	lb.	3.00	
Santocure	lb.	.71 /	.73
NS	lb.	.71 /	.73
Selenacs	lb.	3.00	
SPDX-GH	lb.	.69 /	.74
GL	lb.	1.20 /	1.34
Sulfads	lb.	1.98	
Tellurac	lb.	1.30 /	1.55
Tepidone	lb.	.45	
Tetrone A	lb.	$1.98	
Thiates	lb.	.88 /	$1.25
Thiofide	lb.	.54 /	.56
S	lb.	.64 /	.66
Thionex	lb.	1.14	
Thiotax	lb.	.44 /	.46
Thiurad	lb.	1.14	
Thiuram E	lb.	1.04	
M	lb.	1.14	
Trimene	lb.	.56 /	.58
Base	lb.	1.03 /	1.06
Tuex	lb.	1.14	
Ultex	lb.	1.00 /	1.10
Unads	lb.	1.14	
Ureka Base	lb.	.66 /	.73
Vulcacure NB	lb.	.45	
NS	lb.	.75 /	1.05
T.M.D.	lb.	1.14	
ZB, ZE, ZM	lb.	.85 /	.89
Z-B-X	lb.	2.45	
Zenite	lb.	.54 /	.56
A	lb.	.69 /	.71
AM	lb.	.76 /	.78
Special	lb.	.55 /	.57
Zetax	lb.	.51 /	.53
Zimate	lb.	1.04	
ZMBT	lb.	.55 /	.57

Accelerator-Activators, Inorganic

Lime, hydrated	ton	21.96	
Litharge, comml.	lb.	.1425/	.1575
Eagle, sublimed	lb.	.1585	
National Lead, sublimed	lb.	.1585	
Red lead, comml.	lb.	.185 /	.195
Eagle	lb.	.1625	
National Lead	lb.	.1625/	.1645
PRD-90	lb.	.38 /	.50
White lead, carbonate	lb.	.19 /	.20
Eagle	lb.	.17 /	.18
National Lead	lb.	.18 /	.19
Silicate	lb.	.1725/	.1825
Eagle	lb.	.1475/	.22
National Lead	lb.	.165 /	.175
Zinc oxide, comml.†	lb.	.145 /	.155

Accelerator-Activators, Organic

Aktone	lb.	.2125/	.2325
Barak	lb.	.65	
Capital 170	lb.	.20 /	.25
171	lb.	.1425/	.1925
225, 258, 710	lb.	.14 /	.19
261	lb.	.155 /	.18
262	lb.	.16 /	.185
263	lb.	.1775/	.2025
270	lb.	.1175/	.1425
Curade	lb.	.57 /	.59
D-B-A	lb.	1.95	
Emery 600	lb.	.1425/	.1925
G-M-F	lb.	2.60 /	2.65
PDD-70	lb.	2.70 /	3.00
PGD-25	lb.	1.25 /	1.50
Groco 30	lb.	.1425/	.1925
Guantal	lb.	.62 /	.64
Hyfac 410	lb.	.1475/	.1725
430	lb.	.18 /	.205
431	lb.	.2025/	.2275
Hystrene S-97	lb.	.1863/	.2125
T-45	lb.	.1638/	.19
T-70	lb.	.1738/	.20
Industrene B	lb.	.1263/	.1525
R	lb.	.1138/	.14
158	lb.	.1313/	.1575
254	lb.	.1413/	.1675
262	lb.	.1513/	.1775
Laurex	lb.	.37 /	.39
MODX	lb.	.295 /	.345
NA-22	lb.	1.05	
PND-70	lb.	1.35 /	1.60
Oleic acid, comml.	lb.	.185 /	.225
Emersol 210 Elaine	lb.	.1425/	.1925
Groco 2, 4, 8, 18	lb.	.1425/	.1925
Welcoline	lb.	.21 /	.42
Plastone	lb.	.27 /	.30
Polyac	lb.	1.85	
Ridacto	lb.	.25 /	.26
Seedine	lb.	.1485/	.1703
Stearex Beads	lb.	.1488/	.1588
Stearic acid			
Emersol 120	lb.	.1625/	.1875
150	lb.	.19 /	.215
Hydrofoil 51	lb.	.09	
Hydrogenated, rubber grd.			
Groco 56	lb.	.1225/	.1475
Rufat 75	lb.	.1062/	.1325
Single pressed, comml.	lb.	.1475/	.1675
Emersol 110	lb.	.1575/	.1825
Groco 53	lb.	.1575/	.1825
Wilmar 253	lb.	.1525/	.1775
Double pressed, comml.	lb.	.1525/	.1725
Groco 54	lb.	.1625/	.1875
Wilmar 254	lb.	.1575/	.1825
Triple pressed, comml.	lb.	.175 /	.195
Groco 55	lb.	.18 /	.205
Wilmar 255	lb.	.1875/	.2075
Sterene 60-R	lb.	.09 /	.1075
Tonox	lb.	.54 /	.56
Vimbra	lb.	.32 /	.385
Vulklor	lb.	.88 /	.98
Wilmar 110	lb.	.17 /	.22
434	lb.	.1425/	.1925
Zinc stearate, comml.	lb.	.39 /	.44

Antioxidants

AgeRite Alba	lb.	$2.40 /	$2.50
Gel	lb.	.70 /	.72
H. P.	lb.	.79 /	.80
Hipar	lb.	1.05 /	1.07
Powder	lb.	.57 /	.59
Resin	lb.	.88 /	.90
D	lb.	.57 /	.59
Spar	lb.	.57 /	.59
Stalite	lb.	.57 /	.59
S	lb.	.57 /	.59
Superlite	lb.	.57 /	.59
White	lb.	1.50 /	1.60
Akroflex C	lb.	.85 /	.87
CD	lb.	.79 /	.81
Albasan	lb.	.69 /	.73
Alcogard 354 Powder	lb.	1.50 /	1.52
Allied AA 1144	lb.	.23 /	.24
AA-1177	lb.	.155 /	.165
Aminox	lb.	.57 /	.59
Antioxidant 425	lb.	2.47 /	2.50
2246	lb.	1.50 /	1.53
Antisol	lb.	.23 /	.24
Antisun	lb.	.15 /	.51
Antox	lb.	.59 /	.61
Aranox	lb.	3.25	
Betanox Special	lb.	.94 /	.96
B-L-E, -25	lb.	.57 /	.59
Burgess Antisun Wax	lb.	.185	
B-X-A	lb.	.55 /	.60
CAO-1	lb.	.37 /	.86
-5	lb.	1.49 /	1.63
Copper Inhibiter X-872-L	lb.	2.01	
D-B-P-C	lb.	.91 /	1.16
Deenax	lb.	.95	
Flectol H	lb.	.57 /	.59
Flexamine	lb.	.79 /	.81
Heliozone	lb.	.31 /	.32
Ionol	lb.	.91 /	1.65
Microflake	lb.	.20 /	.24
Naugawhite	lb.	.57 /	.59
NBC	lb.	1.67	
Neozone A	lb.	.64 /	.66
C	lb.	.86 /	.88
D, Special	lb.	.57 /	.59
Nevastain A	lb.	.51 /	.61
B	lb.	.51 /	.70
Nonox CI	lb.	1.50 /	1.67
WSL	lb.	1.50 /	1.60
WSP	lb.	1.47 /	1.60
Octamine	lb.	.57 /	.59
PDA-10	lb.	.46 /	.48
Pennox A, C, D	lb.	.57 /	.59
B	lb.	.67 /	.69
Perflectol	lb.	.61 /	.68
Permalux	lb.	2.25	
Polygard	lb.	.57 /	.59
Polylite	lb.	.55 /	.60
Protector	lb.	.26 /	.31
Rio Resin	lb.	.60 /	.62
Santoflex 35	lb.	.72 /	.79
75	lb.	1.01 /	1.03
AW	lb.	.71 /	.78
B	lb.	.52 /	.59
BX	lb.	.63 /	.70
DD	lb.	.57 /	.59
Santovar A	lb.	1.55 /	1.57
Santowhite Crystals, Powder	lb.	1.55 /	1.62
L	lb.	.57 /	.59
MK	lb.	1.25 /	1.32
Stabilite	lb.	.55 /	.59
Alba	lb.	.72 /	.79
L	lb.	.60 /	.64
White	lb.	.52 /	.60
Powder	lb.	.41 /	.47
Styphen I	lb.	.51 /	.55
Sunolite #100	lb.	.21 /	.23
#127	lb.	.17 /	.19
Sunproof-713	lb.	.26 /	.27
Improved	lb.	.25 /	.26
Jr.	lb.	.22 /	.23
Tenamene 3	lb.	.91 /	1.05
Thermoflex A	lb.	1.05 /	1.07
Tonox	lb.	.54 /	.59
Tysonite	lb.	.24 /	.2475
Velvapex 51-250	lb.	.40	
V-G-B	lb.	.75 /	.80
Wing-Stay S, T	lb.	.55 /	.67
100	lb.	1.00 /	1.08
Zalba	lb.	1.10	
Zenite	lb.	.52 /	.54

Antiozonants

Eastozone 30, 31	lb.	1.05 /	1.09
32	lb.	1.15 /	1.20
Flexone 3-C	lb.	2.00	
6-H	lb.	1.25 /	1.27
Nonox ZA	lb.	1.99 /	2.00
Tenamene 30, 31	lb.	1.24 /	1.28
UOP 88, 288	lb.	1.05 /	1.07

Antiseptics

Copper naphthenate, 6-8%	lb.	.245	
Pentachlorophenol	lb.	.22 /	.30
Resorcinol, technical	lb.	.775 /	.785
Zinc naphthenate, 8-10%	lb.	.245 /	.30

Blowing Agents

Ammonium bicarbonate	lb.	.07 /	.09
Carbonate	lb.	.16	

* Prices, in general, are f.o.b. works. Range indicates grade or quantity variations. No guarantee of these prices is made. Spot prices should be obtained from individual suppliers.

† For trade names, see Color—White, Zinc Oxides.

Blowing Agent 81105	lb.	$0.32 /	$0.35
Celogen	lb.	1.95	
-80	lb.	1.60	
-AZ	lb.	1.92	
Kempore R-125	lb.	1.92	
Opex 40	lb.	.72	
PL-80	lb.	1.44	
Sodium bicarbonate	100 lbs.	2.55 /	3.85
Carbonate, tech.	100 lbs.	1.35 /	5.52
Sponge Paste	lb.	.20	
Unicel ND	lb.	.72	
NDX	lb.	1.44	
S	lb.	.20	
Vulcacel BN	lb.	1.36 /	1.51
BMC	lb.	.68 /	.79

Bonding Agents

Braze	gal.	6.00 /	9.00
Cover cement	gal.	2.50 /	4.00
Chemlok 201, 203	gal.	5.00 /	7.50
220	gal.	9.25 /	12.00
401	gal.	11.70 /	14.40
602	gal.	25.00 /	26.00
607	gal.	18.00	
614	lb.	4.35 /	4.75
Flocking Adhesive RFA17, RFA22, RFA25	lb.	.50	
G-E Silicone Paste SS-15	lb.	4.52 /	5.10
SS-64	lb.	3.65 /	6.75
-67 Primer	lb.	7.50 /	12.50
Gen-Tac Latex	lb.	.70 /	.805
Hylene M	gal.	3.50 /	3.75
M-50	gal.	1.90 /	2.15
Kalabond Adhesive	gal.	6.50 /	16.00
Tie Cement	gal.	2.00 /	5.60
Thixons	gal.	1.48 /	12.00
Ty Ply, BN, Q, S, UP, 364	gal.	6.75 /	8.00
RC	gal.	3.75 /	5.00

Brake Lining Saturants

BRT 3	lb.	.018 /	.0265
Resinex L-S	lb.	.0225/	.03

Carbon Blacks‡

Conductive Channel—CC

Continental R-40	lb.	.26 /	.35
Kosmos/Dixie BB	lb.	.23 /	.30
Texas MC-74-BD	lb.	.26 /	.35
Voltex	lb.	.18 /	.315

Easy Processing Channel—EPC

Collocarb EPC	lb.	.059 /	.099
Continental AA	lb.	.0775/	.155
Kosmobile 77/Dixiedensed 77	lb.	.074 /	.1225
Micronex W-6	lb.	.0725/	.155
Spheron #9	lb.	.0775/	.155
Texas E	lb.	.0775/	.145
Witco #12	lb.	.0775/	.155
Wyex EPC	lb.	.0725/	.155

Hard Processing Channel—HPC

HX HPC	lb.	.074 /	.1225
Kosmobile S/Dixiedensed S	lb.	.074 /	.1225
Micronex Mk. II	lb.	.0775/	.145
Witco #6	lb.	.074 /	.1225

Medium Processing Channel—MPC

Arrow MPC	lb.	.0725/	.155
Continental A	lb.	.0775/	.155
Kosmobile S-66/Dixiedensed S-66	lb.	.0775/	.145
Micronex Standard	lb.	.0725/	.155
Spheron #6	lb.	.0775/	.155
Texas M	lb.	.0775/	.145
Witco #1	lb.	.0775/	.155

Conductive Furnace—CF

Aromex CF	lb.	.0875/	.155
Continex CF	lb.	.11 /	.17
Vulcan C	lb.	.110 /	.185
SC	lb.	.18 /	.255
XC-72	lb.	.25 /	.34

Fast Extruding Furnace—FEF

Arovel FEF	lb.	.0625/	.135
Continex FEF	lb.	.0675/	.135
Kosmos 50/Dixie 50	lb.	.06 /	.10
Philblack A	lb.	.0675/	.135
Statex M	lb.	.0625/	.135
Sterling SO	lb.	.0675/	.135

Fine Furnace—FF

Statex B	lb.	.0675/	.14
Sterling 99	lb.	.0725/	.14

High Abrasion Furnace—HAF

Aromex HAF	lb.	.0725/	.145
Continex HAF	lb.	.0775/	.145
Kosmos 60/Dixie 60	lb.	.079 /	.1175
Philblack O	lb.	.0775/	.145
Statex R	lb.	.0725/	.145
Vulcan #3	lb.	.0775/	.145

Intermediate Super Abrasion Furnace—ISAF

Aromex ISAF	lb.	.0875/	.16
Continex ISAF	lb.	.0925/	.16
Kosmos 70/Dixie 70	lb.	.10 /	.045
Philblack I	lb.	.0925/	.16
Statex 125	lb.	.0875/	16
Vulcan 6	lb.	.0925/	.16

General-Purpose Furnace—GPF

Arogen GPF	lb.	$0.055 /	$0.1275
Continex GPF	lb.	.06 /	.1275
Statex G	lb.	.055 /	.1275
Sterling V	lb.	.06 /	.1275
Non-staining	lb.	.06 /	.1275

High Modulus Furnace—HMF

Collocarb HMF	lb.	.045 /	.085
Continex HMF	lb.	.0625/	.13
Kosmos 40/Dixie 40	lb.	.055 /	.095
Modulex HMF	lb.	.0575/	.13
Statex 93	lb.	.0575/	.13
Sterling L, LL	lb.	.0625/	.13

Semi-Reinforcing Furnace—SRF

Collocarb SRF	lb.	.042 /	.082
Continex SRF	lb.	.0575/	.125
Essex SRF	lb.	.0525/	.125
Furnex	lb.	.0525/	.125
Gastex	lb.	.0625/	.135
Kosmos 20/Dixie 20	lb.	.045 /	.085
Pelletex, NS	lb.	.0575/	.125
Sterling NS, S	lb.	.0575/	.125
R	lb.	.0625/	.135

Super Abrasion Furnace—SAF

Philblack E	lb.	.115 /	.19
Statex 160	lb.	.11 /	.19
Vulcan 9	lb.	.115 /	.19

Fine Thermal—FT

P-33	lb.	.0575	
Sterling FT	lb.	.0575	

Medium Thermal—MT

Sterling MT	lb.	.04	
Non-staining	lb.	.05	
Thermax	lb.	.04	
Stainless	lb.	.05	

Colors

Black

Iron oxides, comml.	lb.	.1235/	.135
BK—Lansco	lb.	.1275/	.13
Williams	lb.	.145	
Lansco synthetic	lb.	.10	
Mapico pure synthetic	lb.	.1475/	.15
Lampblack, comml.	lb.	.16 /	.45
Superjet	lb.	.085 /	.12
Permanent Blue	lb.	.80 /	1.05
Stan-Tone	lb.	.45 /	1.20
Vansul masterbatch	lb.	.60 /	.65
Paste	lb.	.14 /	.15

Blue

Alkali Blue G, R	lb.	2.38	
C. P. Iran Blues	lb.	.52 /	.54
Du Pont	lb.	2.55 /	4.75
Filo	lb.	.28	
Heveatex pastes	lb.	.80 /	1.45
Lansco ultramarines	lb.	.25 /	.28
Monsanto Blue 7	lb.	1.55	
11	lb.	3.45	
DPB-283	lb.	1.93	
S-11	lb.	2.05	
Permanent Blue	lb.	.80 /	1.05
Solfast	lb.	1.60 /	3.25
Stan-Tone Violet Blue			
D-4000	lb.	3.45	
4001	lb.	3.00	
4002	lb.	.90	
4900	lb.	1.97 /	2.15
Vansul masterbatch	lb.	.90 /	2.70

Brown

Filo	lb.	.13	
Iron oxides, comml.	lb.	.1425/	.145
Lansco synthetic	lb.	.125	
Mapico Brown	lb.	.1575/	.16
Sienna, burnt, comml.	lb.	.0425/	.155
Williams	lb.	.115 /	.1775
Raw, comml.	lb.	.045 /	.1325
Williams	lb.	.08 /	.1725
Umber, burnt, comml.	lb.	.06 /	.07
Williams	lb.	.0725/	.085
Raw, comml.	lb.	.0625/	.07
Williams	lb.	.07 /	.0825
Williams, pure brown	lb.	.155	
Vandyke	lb.	.12	
Mapico Tan	lb.	.2325/	.235
Metallic brown pure synthetic	lb.	.05 /	.06
Vansul masterbatch	lb.	2.10 /	2.20

Green

Chrome	lb.	.19 /	.50
Green	lb.	.80 /	2.40
Oxide	lb.	.3925/	1.10
Cyanamid	lb.	.42 /	.44
Green G	lb.	3.00	
Lincoln Green	lb.	5.30 /	6.60
G-4099-6099	lb.	.4525	
GH-9869	lb.	1.10 /	1.25
9976	lb.	1.20 /	1.35
Du Pont	lb.	2.05 /	2.80
Filo	lb.	.40	
Heveatex pastes	lb.	.95 /	1.85
Lansco Toner	lb.	1.35	
Monsanto Green 3	lb.	2.75	
14	lb.	1.45	
17	lb.	3.95	
71205	lb.	1.35	
DGP	lb.	2.03	
S-17	lb.	2.25	

‡ At the request of the suppliers, the lowest prices shown for carbon blacks are for carloads in bags. Prices for hopper carloads are lower.

Permansa	lb.	$1.45	
Serene	lb.	3.50	
Solfast	lb.	1.60 /	$3.35
Stan-Tone			
D-5000	lb.	3.95	
5001	lb.	.82	
5400	lb.	1.45	
Vansul masterbatch	lb.	2.00 /	2.60

Orange

Benzidine 12193	lb.	3.30	
Cyanamid Permatons	lb.	1.50 /	1.56
Dianisidine 10406	lb.	2.85	
Du Pont	lb.	2.25	
Molybdate	lb.	.48	
Monsanto Orange 68187	lb.	2.90	
Stan-Tone			
Light orange 70 PCO3	lb.	2.48 /	2.76
D-7003	lb.	3.97 /	4.17
Orange 70 PCO4	lb.	2.80 /	3.08
D-7004	lb.	4.23 /	4.43
7104	lb.	1.85 /	2.05
Vansul masterbatch	lb.	2.00 /	2.60

Red

Antimony trisulfide	lb.	.285 /	.315
R. M. P. No. 3	lb.	.72	
Sulfur Free	lb.	.78	
Arcturus CP-1270	lb.	1.35	
Brilliant Toning Red	lb.	.77 /	1.90
Cadmium red lithopones	lb.	2.21 /	3.77
Cadmolith	lb.	1.72 /	2.20
Cyanamid	lb.	.93 /	1.90
Naphthol Red, Scarlet	lb.	2.95 /	3.80
Du Pont	lb.	2.00 /	2.05
Filo	lb.	.11	
Indian Red	lb.	.1275	
Iron oxide, comml.	lb.	.06 /	.13
Lansco synthetic	lb.	.1175	
Mapico pure synthetic	lb.	.1425/	.145
Recco	lb.	.12	
Williams Red	lb.	.13 /	.1525
Lake Red C, CP-1104	lb.	1.25	
Monsanto Maroon 113	lb.	1.50	
61148	lb.	1.75	
Red 7	lb.	1.55	
41	lb.	4.40	
3501	lb.	1.15	
4004	lb.	1.50	
69191	lb.	3.38	
Autumn	lb.	1.10	
PRP-285	lb.	1.27	
S-44	lb.	1.28	
Plasticone	lb.	1.02 /	4.60
Rub-Er-Red	lb.	.0975	
Solfast	lb.	1.60 /	1.80
Stan-Tone			
70 PCO5	lb.	3.00 /	3.28
D-2000	lb.	1.25	
2110, 2120, 2121	lb.	.98	
2200	lb.	1.47	
2500	lb.	1.90	
2600	lb.	4.60	
2601	lb.	1.60	
2700		1.75	
2800	lb.	1.90	
Light Red D-7005	lb.	4.68 /	4.88
7105	lb.	1.97 /	2.17
Red 70 PCO6	lb.	3.35 /	3.63
D-7006	lb.	4.89 /	5.09
D-7106	lb.	2.20 /	2.40
Vansul masterbatch	lb.	.95 /	3.30
Venetian	lb.	.04 /	.0675

White

Antimony oxide	lb.	.27 /	.285
Burgess Iceberg	ton	50.00 /	80.00
Cryptone BT	lb.	.10 /	.11
Permolith lithopone	lb.	.0825/	.0912
Titanium pigments			
Horse Head Anatase	lb.	.255 /	.27
Rutile	lb.	.275 /	.29
Rayox LW	lb.	.195 /	.205
R-110	lb.	.215 /	.225
Ti-Cal	lb.	.075 /	.0825
Ti-Pure	lb.	.195 /	.225
Titanox A, AA, A-168	lb.	.255 /	.265
C-50	lb.	.1438/	.1488
RA, -10, -50	lb.	.275 /	.285
RC	lb.	.0963/	.1013
-HT, -HTX	lb.	.0963/	.0988
Rutile	lb.	.205 /	.29
Unitane	lb.	.255 /	.29
Zopaque Anatase	lb.	.245 /	.27
Zinc oxide, comml.	lb.	.145 /	.1825
Azo ZZZ-11, -44, -55	lb.	.145 /	.155
12% leaded	lb.	.125 /	.135
35% leaded	lb.	.15375/	.16375
50% leaded	lb.	.1575/	.1675
Eagle AAA, lead free	lb.	.145 /	.155
5% leaded	lb.	.145 /	.155
35% leaded	lb.	.15375/	.16375
50% leaded	lb.	.1575/	.1675
Florence Green Seal	lb.	.1625/	.1725
Red Seal	lb.	.1575/	.1675
White Seal	lb.	.1675/	.1775
Horsehead XX-4, -78	lb.	.145 /	.155
Kadox-15, -17, -72, -515	lb.	.145 /	.155
-25	lb.	.15 /	.16
Lehigh, 35% leaded	lb.	.15375/	.16375
50% leaded	lb.	.1575/	.1675
Ozide 10-R	lb.	.135 /	.145
Protox-166, -167	lb.	.145 /	.155
St. Joe, lead free	lb.	.145 /	.175
Zinc sulfide, comml.	lb.	.253 /	.263
Cryptone ZS	lb.	.253 /	.263

CONSULTANTS & ENGINEERS

Yellow

Benzidine 12199	lb.	$0.58	/ $2.55
Cadmium yellow lithopones	lb.	1.12	/ 1.15
Cadmolith	lb.	1.12	/ 1.20
Chrome	lb.	.135	/ .145
Cyanamid Hansa Yellow	lb.	2.20	
Du Pont	lb.	2.25	
Filo	lb.	.10	
Iron oxide, comml.	lb.	.0525	/ .1175
Lansco synthetic	lb.	.1075	
Mapico pure synthetic	lb.	.12	/ .1275
Williams	lb.	.115	/ .1225
Lightfast Benzidine 12220	lb.	3.40	
Monsanto Yellow 14	lb.	1.91	
10010	lb.	1.91	
BYP-282	lb.	1.21	
GA	lb.	2.45	
S-10010	lb.	1.17	
Stan-Tone			
D-1100	lb.	2.55	
1101	lb.	.69	
Lemon 70 PCO1	lb.	1.77	/ 2.19
D-7001	lb.	2.80	/ 3.00
Medium yellow 70 PCO2	lb.	1.79	/ 2.21
D-7002	lb.	2.98	/ 3.18
Vansul masterbatch	lb.	.95	/ 1.95
Williams Ocher	lb.	.0575	/ .06

Dusting Agents

Antidust	lb.	.405	/ .445
Diatomaceous silica	ton	32.00	/ 48.00
Extrud-o-Lube, conc.	gal.	1.33	/ 1.69
Glycerized Liquid Lubricant, concentrated	gal.	1.25	/ 1.63
Glyso-Lube, #3	lb.	.14	
Latex-Lube GR	lb.	.20	
Pigmented	lb.	.1825	
R-66	lb.	.165	
Liqui-Lube	lb.	.1625	
N. T.	lb.	.1675	
Liquizinc No. 305	lb.	.30	/ .35
Lubrex	lb.	.25	/ .30
Mica 160 Biotite	lb.	.065	/ .0725
Mesh	lb.	.08	/ .0875
325 Mesh	lb.	.0825	/ .09
Concord	lb.	.08	/ .09
Mineralite	ton	45.00	
Pigmented Separex, LG	lb.	.105	
Pigmented Slab-Dip, S-20	lb.	.11	/ .15
Pyrax A	ton	14.50	/ 15.00
W. A.	ton	17.00	/ 17.50
Rexanol	lb.	.13	
Talc, comml.	ton	18.40	/ 38.50
EM	ton	11.00	/ 63.00
LS Silver	ton	29.25	
Nytals	ton	25.00	/ 36.00
Sierra Sagger 7	ton	34.00	
White IR	ton	19.75	
III	ton	20.75	
Vanfre	gal.	2.00	
Wet-Zinc, CW, P	lb.	.20	/ .2225

Extenders

BRS 700	lb.	.02	/ .036
BRT 7	lb.	.035	/ .036
Cumar Resins	lb.	.065	/ .17
Dielex B	lb.	.06	
Factice, Amberex	lb.	.29	/ .36
Brown	lb.	.1425	/ .263
Neophax	lb.	.157	/ .268
White	lb.	.144	/ .285
G. B. Asphaltenes	lb.	.097	/ .177
Millex, W	lb.	.07	
Mineral Rubbers			
Black Diamond	ton	38.00	/ 40.00
Hard Hydrocarbon	ton	46.50	/ 48.50
Hydrocarbon MR	ton	45.00	/ 55.00
Parmr	ton	21.00	/ 29.00
T-MR Granulated	ton	47.50	/ 50.00
Nuba No. 1, 2	lb.	.0575	/ .0625
3X	lb.	.0775	/ .0825
OPD-101	lb.	.26	
Rubber substitute, brown	lb.	.16	/ .2572
Car-Bel-Ex A	lb.	.14	
Car-Bel-Lite	lb.	.35	
Extender 600	lb.	.1765	
White	lb.	.192	/ .2103
Stan-Shells	ton	35.00	/ 73.00
Sublac Resin PX-5	lb.	.215	/ .235
Sundex 53	gal.	.12	
85	gal.	.1725	
Synthetic 100	lb.	.41	
Vistanex	lb.	.35	/ .475

Fillers, Inert

Agrashell flour	ton	50.00	/ 74.00
Albacar	ton	55.00	/ 75.00
Barytes, floated, white	ton	49.00	/ 70.85
No. 1	ton	55.00	/ 77.50
2	ton	50.00	/ 72.50
Off-color, domestic	ton	25.00	
Sparmite	ton	95.00	/ 117.00
Blanc fixe	ton	100.00	/ 165.00
Burgess HC-75	ton	12.00	/ 30.00
80	ton	14.00	/ 32.00
Iceberg	ton	50.00	/ 80.00
Pigment #20	ton	35.00	/ 60.00
#30	ton	37.00	/ 60.00
WP #1	ton	11.00	/ 16.00
Camel-Carb	ton	14.00	
-Tex	ton	22.00	
-Wite	ton	35.00	
Cary #200	ton	30.00	/ 55.00
Citrus seed meal	lb.	.04	
Oil	lb.	.15	

Note

Suppliers are requested to submit product additions or deletions and price changes promptly in order that we may make the listing of maximum service to our readers. Comments on the present listing and classifications are invited with a view toward facilitating location of specific items.

Correspondence should be directed to Market Editor, RUBBER WORLD, 630 Third Avenue, New York 17, New York.

Clays			
A. F. D. Filler	ton	$29.50	/ $36.00
Aiken	ton	14.00	
Albacar	ton	50.00	/ 55.00
Champion	ton	14.50	
Crown	ton	14.00	/ 33.00
Dixie	ton	14.50	
Franklin	ton	13.50	/ 35.25
GK Soft Clay	ton	11.00	
Harwick	ton	21.50	/ 77.00
Hi-White R	ton	14.50	/ 19.50
Hydratex R	ton	28.00	
Kaolloid	ton	10.50	
LGB	ton	17.50	
LGP	ton	20.00	
McNamee	ton	14.50	
RX-43	ton	33.00	
Natka 1200	ton	12.00	/ 35.00
Par	ton	13.00	
Paragon	ton	14.50	/ 19.50
Polyfil	ton	25.00	/ 45.00
Recco	ton	14.00	
Sno-Brite	ton	12.50	
Stan-Clay	ton	28.00	
Stellar-R	ton	50.00	
Suprex	ton	14.50	/ 19.50
Swanee	ton	12.50	
Windsor	ton	14.00	/ 30.00
DC Silica	lb.	1.15	/ 1.40
Diatomaceous silica	ton	32.00	/ 48.00
Flocks			
Cotton, dark	lb.	.095	/ .135
Dyed	lb.	.55	/ .60
White	lb.	.13	/ .33
Fabrifil X-24-G	lb.	.135	
X-24-W	lb.	.235	
Filfloc 6000	lb.	.33	
F-40-900	lb.	.135	
HSC #35 Silicone Emulsion	lb.	1.22	/ 2.46
Hydrite	ton	25.00	/ 50.00
Kalite	ton	52.50	/ 67.50
Lithopone, comml.	lb.	.075	/ .085
Eagle	lb.	.0725	/ .075
Permolith	lb.	.08	/ .0875
Sunolith	lb.	.075	/ .0825
Mica, 160 Biotite	lb.	.065	/ .0725
Mesh	lb.	.08	/ .0875
325 Mesh	lb.	.0825	/ .09
Concord	lb.	.08	/ .09
Millical	ton	38.00	/ 53.00
Mineralite	ton	40.00	/ 60.00
Non-Fer-Al	ton	35.00	/ 50.00
Ohio Superspray lime	ton	16.50	
Pulverized limestone, Stonelite	ton	8.25	/ 11.00
Purecal	ton	56.75	/ 71.75
Pyrax A	ton	13.50	
W. A.	ton	16.00	
Sawdust	ton	14.00	/ 35.00
Silversheen Mica	lb.	.08	/ .09
Stan White	ton	10.50	/ 13.10
Super-White Silica	ton	25.00	/ 46.50
Surfex	ton	37.50	/ 52.50
MM	ton	42.00	/ 57.00
Suspenso	ton	38.00	/ 53.00
Ti-Cal	lb.	.0675	
Valron Estersil	lb.	2.00	/ 2.25
Walnut shell flours	ton	50.00	/ 84.00
Whiting, limestone			
Atomite	ton	32.50	/ 35.00
Calcite	ton	23.00	
Calwhite	ton	20.00	/ 27.00
-T	ton	23.00	
Duramite	ton	20.00	
Gamaco	ton	32.50	/ 40.00
Keystone	ton	20.00	/ 22.00
Laminar	ton	30.00	
No. 10 White	ton	11.00	/ 16.50
Omya	ton	30.00	
BSH	ton	45.00	
Paxinosa	ton	14.50	/ 22.50
Snowflake	ton	17.00	/ 18.00
Witco	ton	13.00	
York	ton	9.50	

Finishes

Apex Bright Finish #5200-E	lb.	.25	
Rubber Finish	gal.	2.50	
Black-out	gal.	4.50	/ 8.00
Flocks, Rayon, colored	lb.	$0.90	/ $1.50
White	lb.	.75	/ 1.25
Also see Flocks, under Fillers, Inert			
Paraflint RG and RGU Synthetic Wax	lb.	.15	/ .22
Rubber lacquer, clear	gal.	1.00	/ 2.00
Shellacs, Angelo	lb.	.485	/ .7325
Vac Dry	lb.	.485	/ .57
Talc (*See Talc, under Dusting Agents*)			
Unidip	lb.	.15	/ .20
Wax, Bees	lb.	.67	/ .83
Carnauba	lb.	.57	/ 1.13
Monten	lb.	.27	
Neutral	gal.	.76	/ 1.31
No. 118, colors	gal.	.86	/ 1.41
Van Wax	gal.	1.45	/ 1.50

Latex Compounding Ingredients

Acintol D, DLR	lb.	.0625	/ .085
FA #1	lb.	.0675	/ .09
#2	lb.	.0825	/ .105
Accelerator 552	lb.	2.25	
Accelerator J-117, -302	lb.	1.00	/ 1.15
-144	lb.	.15	/ .30
-307	lb.	1.10	/ 1.25
-311	lb.	.60	/ .75
Aerosol, dry types	lb.	.65	/ .80
Liquid types	lb.	.40	/ .75
Alcogard 354	lb.	1.40	/ 1.42
Alcogum AK-12	lb.	.12	/ .14
AN-6	lb.	.055	/ .06
-10	lb.	.09	/ .10
-25	lb.	.31	
PA-15	lb.	.16	
Alrosol	lb.	.41	
Amberex solutions	lb.	.1675	/ .18
Antifoam J-114	lb.	3.25	/ 3.45
P-242	lb.	.24	/ .35
Antioxidant J-137, -140	lb.	.55	/ .70
-139, -293	lb.	1.45	/ 1.60
-182	lb.	2.00	/ 2.15
-186	lb.	1.40	/ 1.55
2246	lb.	1.50	/ 1.53
Anti Webbing Agent J-183	lb.	.75	/ .90
-297	lb.	.27	/ .40
Aquablak B	lb.	.0975	/ .1025
G	lb.	.12	/ .125
K	lb.	.12	/ .125
M	lb.	.105	/ .11
Aquarex D	lb.	.81	
G	lb.	.21	
L	lb.	.94	
MDL	lb.	.33	
ME	lb.	.82	
Aquarex NS	lb.	.60	
SMO	lb.	.50	
WAQ	lb.	.22	
Areskap 50	lb.	.30	/ .38
100, dry	lb.	.60	/ .72
Aresket 240	lb.	.30	/ .38
300, dry	lb.	.60	/ .72
Aresklene 375	lb.	.42	/ .57
Ben-A-Gels	lb.	.98	/ 1.40
Bentone 18, 18C	lb.	.45	
34	lb.	.60	
Casein	lb.	.22	
Cellosize WP-09, -3, -40, -300	lb.	1.00	/ 1.17
CW-12	lb.	.85	
-37	lb.	.70	
DC Antifoam A Compound	lb.	5.45	/ 6.65
B	lb.	.63	/ 1.10
Emulsion	lb.	2.05	/ 4.00
AF Emulsion	lb.	2.05	/ 2.85
Compound 7	lb.	5.13	/ 6.50
Defoama W-1701	lb.	.125	
Defoamer 115a	lb.	.50	
NDW	lb.	.215	/ .235
Dispersing Agents			
Blancol	lb.	.1525	/ .26
N	lb.	.155	/ .26
Darvan Nos. 1, 2, 3	lb.	.22	/ .30
Daxad 11, 21, 23, 27	lb.	.08	/ .30
Dispersaid H7A	lb.	.58	
1159	lb.	.43	
Emulphor ON-870	lb.	.50	/ .70
Igepal CO-630	lb.	.2875	/ .47
Igepon T-73	lb.	.285	/ .495
T-77	lb.	.45	/ .69
Indulins	lb.	.06	/ .08
Kreelons	lb.	.132	/ .155
Laurelton Oil	lb.	.18	
Leonil SA	lb.	.52	/ .65
Lomar PW	lb.	.18	
Marasperse CB	lb.	.1225	/ .1425
N	lb.	.095	/ .105
Modicols	lb.	.17	/ .58
Nekal BA-75	lb.	.395	/ .54
BX-76	lb.	.63	/ .75
Nopco 1287	lb.	.155	/ .195
Orzan A	lb.	.0325	
S	lb.	.0425	
Pluronics	lb.	.335	/ .40
Polyfons	lb.	.08	/ .09
Sorapon SF-78	lb.	.28	/ .40
Tergitol 7	lb.	.4125	/ .44
NPX	lb.	.275	/ .3074
TMN	lb.	.2875	/ .32
Trenmine W-30	lb.	.15	
W-40	lb.	.60	/ .75
Triton R-100	lb.	.12	/ .25
X-100, -102, -114	lb.	.255	/ .36
Dispersions			
Agebest 1293-22	lb.	1.90	/ 2.00
AgeRite Alba	lb.	3.00	
Powder, Resin D	lb.	.80	
White	lb.	1.80	

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CHEMIST or CHEMICAL ENGINEER

TO SUPERVISE COMPOUNDING ON NEW ELASTOMERS

Several years experience in rubber industry required with emphasis on all types of rubbers. Background should include wide knowledge of and work with applications. Will report to the Development Manager. The man desired is now probably working for a raw material supplier and evaluates a variety of polymers. This is a major opportunity in a rapidly expanding chemical organization near Parkersburg, city of 60,000 in the expanding Ohio River Valley.

All replies held strictly confidential. Address inquiry to:

E. M. Mills, personnel director

MARBON CHEMICAL

DIVISION OF BORG-WARNER

Box 68, Washington, West Virginia

CHIEF CHEMIST—COMPOUNDER
Rapidly expanding precision molded goods mfr. wants Chief Chemist with experience in high-temperature fuel & oil resistant stocks. Address Box No. 2383, care of RUBBER WORLD.

TECHNICAL TROUBLE-SHOOTER FOR MEDIUM-SIZED OHIO rubber plant. Automotive and Household Products. Rubber chemistry and compounding experience necessary. Excellent opportunity for right man who can produce results in the factory. Address Box No. 2389, care of RUBBER WORLD.

SITUATIONS WANTED

TECHNICAL DIRECTOR-FACTORY MANAGER. TWENTY years' diversified experience in development, production, management, and administration in the rubber industry. Résumé on request. Address Box No. 2385, care of RUBBER WORLD.

TECH. DIRECTOR, NOW EMPLOYED, SEEKS NEW POSITION. Lab. supervision, formula development, plant processing problems. Experience with new polymers and meeting specifications. Address Box No. 2384, care of RUBBER WORLD.

MACHINERY & SUPPLIES FOR SALE

SURPLUS EQUIPMENT

4—Blaw Knox 6' x 40' Horizontal Vulcanizers with quick-opening doors, 250# working pressure, ASME.
1—Bolling 3-roll Laboratory Calender, 8" x 16".
2—Royle #½ Extruders, complete.
1—Banbury Midget Mixer with 2-HP gear motor.
1—Farrel-Birmingham 3-roll Lab Calender, 6" x 12".
Address Box No. 2387, care of RUBBER WORLD.

FOR SALE: 71—BAKER-PERKINS 200-GAL. DOUBLE-ARM mixers, sigma or duplex blades, jacketed, tilting mechanism, motors & drives. Priced to sell fast! PERRY EQUIPMENT CORP., 1424 N. 6th St., Phila. 22, Pa.

6—NEW FARREL-BIRMINGHAM 14" X 30" TWO-ROLL MILLS. Other sizes up to 60". Hydraulic Presses, 300-ton upstroke 40" x 30". 300-ton upstroke 22" x 35". 240-ton upstroke with ten 24" x 56" platens. 200-ton Farrel 30" x 30". 150-ton Farrel 24" x 24". Adamson 6" Rubber Extruder. New and used Laboratory 6" x 13", 6" x 16", and 8" x 16" Mills and Calenders. Baker-Perkins and Day Heavy-Duty Jacketed Mixers, up to 200 gallons. Hydraulic pumps and accumulators. Cumberland #½ Rotary Cutter 5 HP and other sizes. Banbury Mixers, Crushers, Churns, Tubers, Vulcanizers, Bale Cutters, Gas Boilers, etc.
SEND FOR SPECIAL BULLETIN. WE BUY YOUR SURPLUS MACHINERY. STEIN EQUIPMENT COMPANY, 107-8th STREET, BROOKLYN 15, NEW YORK, STERLING 8-1944.

MACHINERY & SUPPLIES FOR SALE (Cont'd)

FOR SALE: OAKES MODEL M14 MIXER. STAINLESS-STEEL head. Excellent condition. Address Box No. 2388, care of RUBBER WORLD.

CHECK THESE BARGAINS
ERIE ENGINE & MANUFACTURING CO. 84" TWO-ROLL MILL
Top cap, Late type, a real buy before removal!
RUBBER TUBERS
Farrel 3" Steamheated; Adamson 6" dia. Steamheated; Royle #2 Perfected 3¼" dia, with Reliance drive. 18" x 40" 4-roll L-type Calender, herringbone gear. 16" x 42" Rubber Mill, top cap. 16" x 30" Farrel Cracker.
RUBBER MOLDING PRESSES
250 Tons 4-opening, 24" x 24" Steam Platens. 1100-Ton Elmes with 10 openings. 37" x 37" Steam Platens.
A full line of equipment for the RUBBER INDUSTRY, including Mixers, Mills, Calenders, Extruders, Vulcanizers, etc.
WE WILL FINANCE
JOHNSON MACHINERY COMPANY
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BIgelow 8-2500
What do you need? What have you to sell?

FOR SALE: 1—22" X 60" FARREL 3-ROLL VERTICAL CALENDER. 1—32" x 32" hydraulic press, 16" ram. 1—16" x 40" Thropp 2-roll rubber mill. 2—75-gallon Day jacketed double-arm mixers.
CHEMICAL & PROCESS MACHINERY CORP.
52 Ninth Street
Brooklyn 15, New York
HYacinth 9-7200

MACHINERY — ALBERT REBUILT

ANYTHING AND EVERYTHING

P. E. ALBERT & SON

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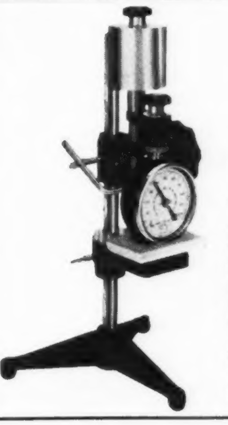
TRENTON, N. J.



RUBBER HARDNESS

ORIGINAL SHORE

DUROMETER

ASTM D676 AND ASTM D1484

Various models for testing the entire range of hardness from elastomeric to rigid. Available in quadrant or round dial case. May be used free hand or on table top OPERATING STAND WITH DEAD WEIGHT (left).

THE SHORE INSTRUMENT & MFG. CO., INC.

90-35 VAN WYCK EXP., JAMAICA 35, N.Y.

Dispersions (*Cont'd*)

Altax	lb.	$0.75	
Shield Nos. 2, 6	lb.	.08	
3	lb.	.095	
4-35	lb.	.09	
5	lb.	.093	
7-F, 8	lb.	.165	
55	lb.	.18	
Iron Oxide, 60%	lb.	.40	
L.S.W.	lb.	1.50	
No. 305 Liquizinc	lb.	.30 /	$0.35
P-33	lb.	.35	
Rotax	lb.	.75	
Sulfur	lb.	.12 /	.30
No. 2	lb.	.14 /	.16
Telloy	lb.	3.00	
Tuads, Methyl	lb.	1.14	
Vulcacure NB	lb.	.45	
NS	lb.	.75 /	1.05
T.M.D.	lb.	1.14	
ZB, ZE, ZM	lb.	.85 /	.89
Vulcanizing, C group	lb.	.40 /	1.30
G group	lb.	.45 /	.90
N group	lb.	.40 /	1.00
Zetax	lb.	.75	
Zimates, Butyl	lb.	1.04	
Ethyl, Methyl	lb.	1.04	
Zinc oxide	lb.	.40	

Emulsions

AgeRite Stalite	lb.	.75	
Borden Arcco A-25, A-26, 716-30	lb.	.18 /	.19
555-40R	lb.	.185 /	.205
620-32B	lb.	.20 /	.21
716-35	lb.	.17 /	.18
1041-21	lb.	.165 /	.175
Habuco Resin Nos. 502, 515, 523	lb.	.195 /	.20
503	lb.	.22 /	.225
504, 526	lb.	.19 /	.195
517	lb.	.175 /	.18
524	lb.	.155 /	.16
Resin A-2	lb.	.16 /	.25
P-370	lb.	.175 /	.25
X-210	lb.	.12 /	.22
Freeze-Stabilizer 322	lb.	.40	
12116C	lb.	.52	
Hyonic PE 250	lb.	.255 /	.295
Igepon T-43	lb.	.145 /	.35
T-51	lb.	.125 /	.285
-73	lb.	.285 /	.495
Ludox	lb.	.1675/	.195
Marmix	lb.	.41 /	.48
Merac	lb.	.75 /	1.05
Micronex, colloidal	lb.	.06 /	.072
Modical S	lb.	.3084/	.3284
VD	lb.	.1384/	.1584
Monsanto Blue 4685 WD	lb.	1.60	
Green 4884 WD	lb.	1.80	
Red 127	lb.	1.25	
OPD 101	lb.	.16 /	.26
Picco Latex Plasticizer A-12	lb.	.069 /	.096
Pliolite Latex 150, 190	lb.	.32 /	.41
170	lb.	.37 /	.46
Polyvinyl methyl ether	lb.	.25 /	.45
Resin V	lb.	.13	
Roelgel 100C	lb.	.46	
Santomerse D	lb.	.44 /	.65
S	lb.	.13 /	.25
Sellogen Gel	lb.	.1275	
Sequestrene AA	lb.	.905 /	.975
ST	lb.	.585 /	.615
30A	lb.	.245 /	.265
Setsit #5	lb.	.75 /	1.05
D #9	lb.	.85 /	1.15
Stablex A	lb.	.80 /	1.10
B, G	lb.	.50 /	.95
K	lb.	.27 /	.35
P	lb.	.35 /	.50
T	lb.	.14 /	.22
Surfactol 13	lb.	.345 /	.36
Vult-Accel E	lb.	.85 /	.92
Webnix	lb.	1.50 /	2.50

Mold Lubricants

A-C Polyethylene	lb.	.30 /	.47
Acintol D	lb.	.0625/	.085
Alipal CO-433	lb.	.25 /	.45
CO-436	lb.	.22 /	.41
Aquarex Compounds	lb.	.21 /	.94
Carbowax 200, 300, 400	lb.	.22 /	.25
1500	lb.	.225 /	.2825
4000	lb.	.31 /	.32
6000	lb.	.35 /	.36
Castorwax	lb.	.3375/	.3575
Colite Concentrate	gal.	.90 /	1.15
D-Tak Dip #10	gal.	1.50	
DC Mold Release Fluid	lb.	3.14 /	4.75
200 Fluid	lb.	3.14 /	4.75
Compound 4, 7	lb.	5.13 /	6.50
Emulsion 7	lb.	1.20 /	1.74
8, 35, 35A, 35B, 36	lb.	1.20 /	1.74
ELA	lb.	.82	
FT Wax 200	lb.	.265 /	.42
300	lb.	.295 /	.45
Glycerized Liquid Lubricant, concentrated	gal.	1.25 /	1.63
Igepals	lb.	.2875/	.74
Igepon AP-78	lb.	.44 /	.68
T-43	lb.	.145 /	.35
-51	lb.	.125 /	.285
-73	lb.	.285 /	.495
L-41 Diethyl Silicone Oil	lb.	3.50	
Lubrex	lb.	.27 /	.32
Lubri-Flo	gal.	10.00 /	12.05
Lustermold	lb.	.41	
Mold Lubricant No. 426	lb.	.18	
Paste	lb.	.25	
Monopole Oil	lb.	.16	
Monten Wax	lb.	$0.57	
MR-22	gal.	9.95 /	$14.95
Para Lube	lb.	.046 /	.048
Paraflint RG and RGU Synthetic Wax	lb.	.15 /	.22
Plaskon 8406, 8407	lb.	.30 /	.37
8416, 8417	lb.	.35 /	.42
8429	lb.	.40 /	.47
Pluronics	lb.	.335 /	.44
Poly-Brite PE-20	lb.	.28 /	.42
600	lb.	.42 /	.58
Poly-Cone 125X	lb.	1.20 /	1.40
1000	lb.	.93 /	1.06
Polyglycol E series	lb.	.29 /	.42
RA-1, -2, -3	gal.	2.25 /	3.00
Rubber Glo	gal.	.94 /	.97
Silrex S-1	lb.	.65	
SM-33, -55, -61, -62	lb.	1.22 /	1.76
Soap, Hawkeye	lb.	1.25 /	1.45
Purity	lb.	.155 /	.165
Sodium stearate	lb.	.40	
Stoner's 700 series	gal.	1.20 /	1.25
800 series	gal.	1.26 /	1.70
900 series	gal.	1.55 /	2.55
A Series	gal.	1.80 /	4.50
Ucon 50-HB Series	lb.	.25 /	.375
Ulco	lb.	.12 /	.23
Vanfre	gal.	1.95 /	3.00

Odorants

Alamasks	lb.	.75 /	6.50
Coumarin	lb.	2.95 /	3.55
Curodex 19	lb.	4.75 /	5.05
188	lb.	5.75	
198	lb.	5.75	
Ethavan	lb.	6.75 /	7.35
Latex Perfume #7	lb.	4.00	
Neutroleum Gamma	lb.	3.60	
Rodo	lb.	4.00 /	5.50
Rubber Perfume #10	lb.	2.60	
Vanillin, Monsanto	lb.	3.00 /	3.15

Plasticizers and Softeners

Acintol DLR	lb.	.0625/	.085
Adipol 2EH, 10A, XX	lb.	.40 /	.435
BCA	lb.	.45 /	.475
ODY	lb.	.43 /	.465
Admex 710	lb.	.3325/	.3625
711	lb.	.3325/	.3825
744	lb.	.3925/	.3825
Aro Lene #1980	lb.	.10 /	.12
Baker AA Oil	lb.	.195 /	.24
Crystal O Oil	lb.	.21 /	.255
Processed oils	lb.	.215 /	.235
Bardol, 639	lb.	.0275/	.0375
B	lb.	.055 /	.065
Benzoflex 2-45	lb.	.26 /	.29
9-88	lb.	.27 /	.30
Bondogen	lb.	.555 /	.605
BRC-20	lb.	.022 /	.0245
22	lb.	.026 /	.0285
30	lb.	.0165/	.025
521	lb.	.023	
BRH 2	lb.	.0341/	.0351
BRS 700	lb.	.036	
BRT 7	lb.	.035 /	.036
BRV	lb.	.0625/	.065
Bunarex Liquid	lb.	.0425/	.0555
Resins	lb.	.065 /	.1225
Bunnatol G, S	lb.	.40 /	.505
Butac	lb.	.1285/	.1385
Butyl stearate, comml.	lb.	.255	
B-17	lb.	.21 /	.33
Binney & Smith	lb.	.23 /	.26
Harchem	lb.	.2525/	.3425
Kessoflex	lb.	.245 /	.275
Ohio-Apex	lb.	.26 /	.29
Butyl stearate—G.P.	lb.	.0125/	.02
R-100	lb.	.045 /	.0525
TT	lb.	.017 /	.02
Califlux 510, 550	lb.	.0275/	.0375
G.P.	lb.	.015 /	.0225
R-100	lb.	.0475/	.0575
T-T	lb.	.019 /	.0295
Capryl alcohol, comml.	lb.	.195 /	.235
Columbian Carbon	lb.	.195 /	.30
Harchem	lb.	.195 /	.30
Chlorowax 40	lb.	.1625/	.1825
70	lb.	.185 /	.245
-S	lb.	.21 /	.27
Circo light	gal.	.17	
Circosol-2XH	gal.	.185	
Contogums	lb.	.0875/	.111
Cumar Resins	lb.	.065 /	.17
DBM (dibutyl-m-cresol)			
Darax	lb.	.32 /	.3475
DBP (dibutyl phthalate), comml.	lb.	.26 /	.40
Darex	lb.	.30 /	.33
Eastman	lb.	.26 /	.30
Harflex 140	lb.	.26 /	.40
Harwick Std. Chem. Co.	lb.	.325 /	.385
Hatco	lb.	.30 /	.33
Monsanto	lb.	.26 /	.30
Naugatuck	lb.	.30 /	.33
Ohio-Apex	lb.	.26 /	.30
PX-104	lb.	.26 /	.30
Rubber Corp. of America	lb.	.26 /	.44
Sherwin-Williams	lb.	.30 /	.33
DBS (dibutylsebacate) comml.	lb.	.66 /	.69
Eastman	lb.	.655 /	.685
Harflex 40	lb.	.655 /	.745
Hatco	lb.	.66 /	.685
Monoplex	lb.	.66 /	.675
Naugatuck	lb.	.665 /	.69
PX-404	lb.	.665 /	.715
DCP (dicaprylphthalate), comml.	lb.	$0.295 /	$0.325
Harflex 180	lb.	.25 /	.39
Hatco	lb.	.295 /	.325
Monoplex	lb.	.30 /	.315
DDA (didecyladipate)			
Good-rite GP-236	lb.	.40 /	.55
Kessoflex	lb.	.40 /	.435
DDP (didecylphthalate)			
Good-rite GP-266	lb.	.295 /	.45
Hatco	lb.	.305 /	.435
Defoamer X-3	lb.	.355	
DIBA (diisobutyladipate)			
Darex	lb.	.4325/	.4625
Eastman	lb.	.40 /	.44
Ohio-Apex	lb.	.41 /	.445
DIDA (diisodecyladipate)			
Monsanto	lb.	.40 /	.435
RC	lb.	.40 /	.54
DIDP (diisodecylphthalate)			
Darex	lb.	.32 /	.35
Harflex 110	lb.	.26 /	.40
Monsanto	lb.	.26 /	.30
Ohio-Apex	lb.	.26 /	.30
PX-120	lb.	.26 /	.30
RC	lb.	.26 /	.43
Dielex B	lb.	.06	
Diethylene glycol, comml.	lb.	.1525/	.1825
Wyandotte	lb.	.15 /	.165
Dinopol IDO	lb.	.285 /	.32
DIOA (diisooctyladipate)			
Harflex 220	lb.	.40 /	.495
Kessoflex	lb.	.40 /	.435
Naugatuck	lb.	.435 /	.465
PX-208	lb.	.40 /	.435
Rubber Corp. of America	lb.	.40 /	.54
DIOP (diisooctylphthalate), comml.	lb.	.305 /	.335
Darex	lb.	.32 /	.35
Eastman	lb.	.25 /	.29
Harflex 120	lb.	.25 /	.39
Hatco	lb.	.305 /	.335
Monsanto	lb.	.25 /	.29
Naugatuck	lb.	.305 /	.335
Ohio-Apex	lb.	.25 /	.29
PX-108	lb.	.26 /	.30
Rubber Corp. of America	lb.	.25 /	.43
Sherwin-Williams	lb.	.32 /	.34
DIOS (diisooctylsebacate), comml.	lb.	.61 /	.64
Rubber Corp. of America	lb.	.5925/	.70
DIOZ (diisooctylazelate)			
Cabflex	lb.	.48 /	.51
Dipolymer Oil	gal.	.33 /	.38
Dispersing Oil No. 10	lb.	.06 /	.0625
DNODA (di-n-octyl-n-decyl adipate), Monsanto	lb.	.40 /	.435
DOA (dioctyladipate), comml.	lb.	.425 /	.455
Eastman	lb.	.40 /	.43
Good-rite GP-233	lb.	.40 /	.55
Harflex 250	lb.	.40 /	.495
Hatco	lb.	.435 /	.465
Monsanto	lb.	.40 /	.435
Naugatuck	lb.	.435 /	.465
PX-238	lb.	.40 /	.435
Rubber Corp. of America	lb.	.40 /	.54
DOP (dioctylphthalate), comml.	lb.	.305 /	.335
Darex	lb.	.32 /	.35
Eastman	lb.	.28 /	.315
Good-rite GP-261	lb.	.285 /	.44
Harflex 150	lb.	.25 /	.39
Hatco	lb.	.305 /	.335
Monsanto	lb.	.25 /	.29
Naugatuck	lb.	.305 /	.335
Ohio-Apex	lb.	.25 /	.29
Polycizer 162	lb.	.28 /	.435
PX-138	lb.	.25 /	.29
Rubber Corp. of America	lb.	.25 /	.43
Sherwin-Williams	lb.	.305 /	.335
DPS (dioctylsebacate), comml.	lb.	.61 /	.64
Eastman	lb.	.61 /	.64
Harflex 50	lb.	.5925/	.6825
Hatco	lb.	.61 /	.635
Monoplex	lb.	.61 /	.635
Naugatuck	lb.	.615 /	.64
PX-438	lb.	.5925/	.6225
Rubber Corp. of America	lb.	.5925/	.70
DOZ (di-ethylhexyl azelate)			
Kessoflex	lb.	.46 /	.48
Drapex 3.2	lb.	.40 /	.54
Dutch Boy NL-A10 (DBP)	lb.	.30 /	.33
-A20 (DOP), A30 (DIOP)	lb.	.305 /	.335
-A54	lb.	.295 /	.325
-C20 (DOS)	lb.	.61 /	.63
-F21	lb.	.395 /	.425
-F31	lb.	.44 /	.47
-F41	lb.	.48 /	.51
Dutrex 6	lb.	.025 /	.035
Dymerex Resin	lb.	.135 /	.1475
Elastex 36-R	lb.	.43 /	.4625
37-R	lb.	.70 /	.71
Emulphor EL-719	lb.	.52 /	.73
Endor	lb.	.67	
Ethox	lb.	.43 /	.455
Ethylene glycol, comml.	lb.	.135 /	.165
Wyandotte	lb.	.1325/	.1425
Flexol 3 GH	lb.	.44 /	.46
3 GO	lb.	.53 /	.55
4 GO	lb.	.325 /	.355
10-A	lb.	.425 /	.455
426	lb.	.27 /	.30
810, 810X, 10-10, 10-10X	lb.	.305 /	.335
TPF, A-26	lb.	.435 /	.465
Flexricin P-4	lb.	.3475/	.3625
P-6	lb.	.415 /	.43

The Classified Columns of
RUBBER WORLD
bring prompt results at low cost.

Flexricin P-8	lb.	$0.3475	$0.3625
PG-16	lb.	.335	.35
Fortex	lb.	.125	.145
Fura-Tone NC 1008	lb.	.28	
1012	lb.	.46	
G. B. Asphaltic Flux	gal.	.097	.177
Naphthenic Neutrals	gal.	.125	.215
Process oil, light	lb.	.0275	.0375
Medium	lb.	.0375	.0475
Galex W-100	lb.	.155	.18
W-100 D	lb.	.1525	.1775
Gilsowax B	lb.	.0975	.11
Harchemex	lb.	.24	.345
Harflex 300	lb.	.58	.675
325	lb.	.4325	.52
375	lb.	.7425	.83
500	lb.	.315	.41
HB-20	lb.	.19	.22
-40	lb.	.15	.17
Heavy Resin Oil	lb.	.0225	.0375
HSC-13	lb.	.25	.32
-39	lb.	.22	.29
Hycar 1312	lb.	.60	
Kapsol	lb.	.33	.355
Kenflex A, L	lb.	.26	.27
B	lb.	.23	.24
N	lb.	.18	.19
Kessoflex 103	lb.	.405	
105	lb.	.3325	
106	lb.	.38	
107	lb.	.525	
110	lb.	.24	
111	lb.	.28	
KP-23	lb.	.325	.335
-90	lb.	.40	.435
-140	lb.	.46	.485
-201	lb.	.45	.465
-220	lb.	.33	.365
-555	lb.	.59	.60
Kronisol	lb.	.34	.375
Kronitex AA, I, K-3, Mx	lb.	.325	.36
LX-685, -125, -135	lb.	.125	.135
Marvinol plasticizers	lb.	.28	.8825
Methox	lb.	.375	.40
Millrex	lb.	.15	
Monoplex S-38	lb.	.215	.24
S-71	lb.	.45	.475
Morflex	lb.	.25	.65
Natac	lb.	.1235	.1335
Neoprene Peptizer P-12	lb.	1.05	
Nevillac	lb.	.31	.85
Neville R Resins	lb.	.145	.205
Nevinol	lb.	.24	
No. 1-D heavy oil	lb.	.065	
NP-10	lb.	.50	.53
ODA (octyldecyladipate)			
Good-rite GP-235	lb.	.40	.55
Kessoflex	lb.	.40	.435
RC	lb.	.40	.54
ODP (octyldecylphthalate)			
Good-rite GP-265	lb.	.29	.445
Hatco	lb.	.305	.335
Rubber Corp. of America	lb.	.255	.43
Ohopex Q-10	lb.	.265	.305
R-9	lb.	.3525	.3775
Orthonitro benzophenol, comml.	lb.	.13	.15
Palmalene	lb.	.15	
Panaflex BN-1	lb.	.185	.225
Panarez Resins	lb.	.09	.14
Para Flux, regular	gal.	.10	.2125
No. 2016	gal.	.165	.24
2332	gal.	.11	
4205	lb.	.1075	.2125
Para Lube	lb.	.46	.48
Resins	lb.	.04	.045
Paradene Resins	lb.	.07	.08
Paraplex 5-B	lb.	.29	.3475
Al-111	lb.	.32	.3275
G-25	lb.	.76	.77
-40	lb.	.4825	.51
-50	lb.	.39	.4175
-53	lb.	.4325	.46
-60	lb.	.325	.35
-62	lb.	.345	.37
RG-7	lb.	.33	.335
-8	lb.	.505	.5125
-10	lb.	.52	.5275
Pepton 22	lb.	.83	.86
65	lb.	1.23	1.26
65-B	lb.	.83	.86
Philrich 5	gal.	.125	
Picco Resins	lb.	.1275	.22
480 Oilproof Series	lb.	.18	.23
Aromatic Plasticizers	lb.	.05	.065
Liquid Resin D-165 (Y)	lb.	.06	.075
(Z-3)	lb.	.07	.085
(Z-6)	lb.	.08	.095
S. O. S.	gal.	.29	.34
Piccocizers	lb.	.04	.055
Piccolastic Resins	lb.	.16	.25
Piccolyte Resins	lb.	.205	.245
Piccopale Resins	lb.	.12	.135
Piccovars	lb.	.165	.20
Piccovol	lb.	.025	.038
Pictar	gal.	.25	.30
Pigmentar	lb.	.046	.0634
Pigmentaroil	lb.	.046	.0634
Pitch, Burgundy, Sunny South	lb.	.103	.1085
Pitt-Consol 500	lb.	.28	.305
640	lb.	.42	
Plasticizers			
42	lb.	.34	.40
84	lb.	.25	.29
B	lb.	.35	.45
DP-520	lb.	.435	.455
MP	lb.	.035	.0755
MT-511	lb.	.6925	.7425
ODN	lb.	$0.35	$0.475
SC	lb.	.38	.55
Plastoflex #3	lb.	.52	.57
#520	lb.	.36	.435
DBE	lb.	.50	.55
MGB	lb.	.29	.37
SP-2	lb.	.43	.48
VS	lb.	.3575	.3975
Plastogen	lb.	.0875	.09
Plastone	lb.	.25	.32
Polycin 470	lb.	.325	.34
Polycizers	lb.	.25	.415
162	lb.	.25	.405
Polymel-C	lb.	.1775	.1875
DX, C-130	lb.	.1375	.1475
D	lb.	.225	.235
D-TAC	lb.	.1975	.215
Poly-Sperse AP-2	lb.	.23	.295
AP-300	lb.	.26	.325
LC-20	lb.	.26	.325
R-100	lb.	.17	.235
PT Pine Tars	lb.	.038	.0554
101 Pine Tar Oil	lb.	.038	.0554
Reogen	lb.	.1425	.145
Resin C pitch	lb.	.0225	.031
Resin R6-3	lb.	.38	.40
Resinex 10, 25, 50, 110	lb.	.04	.045
70	lb.	.0325	.0375
85, 100	lb.	.035	.04
115	lb.	.0375	.0425
L-2, L-3, L-4, L-5	lb.	.0225	.03
Rosin Oil, Sunny South	gal.	.58	.76
RPA No. 2	lb.	.85	
3	lb.	.51	
Conc.	lb.	.85	
6	lb.	1.66	
RSN Flux	gal.	.10	.91
Rubber Oil B-5	lb.	.0225	.0355
Rubberol	lb.	.18	.2725
Santicizer 1-H	lb.	.50	.52
8	lb.	.44	.46
9	lb.	.42	.44
140	lb.	.325	.36
141	lb.	.34	.375
160	lb.	.25	.29
409	lb.	.39	
602	lb.	.285	
B-16	lb.	.4475	.4675
E-15	lb.	.51	.54
Santocizer	lb.	.4275	.4575
Sebacic acid, purified, comml.	lb.	.59	.65
Binney & Smith	lb.	.64	.76
C. P.-Binney & Smith	lb.	.72	.84
Harchem	lb.	.655	.815
Sherolatum Petroleum	lb.	.05	.10
Softener #20	gal.	.10	.20
Special Rubber Resin 100	lb.	.1675	.2175
Staflex AX	lb.	.43	
DBES	lb.	.61	.635
Syn-Tac	gal.	.33	.635
Synthol	lb.	.17	.2625
Tetraflex R-122	lb.	.245	.285
Thiokol TP-90B	lb.	.59	
-95	lb.	.65	
Triacetin	lb.	.37	.41
Tributyl phosphate	lb.	.50	.535
Tributyrin	lb.	.69	
Tricresyl phosphate, comml.	lb.	.33	.36
Monsanto	lb.	.325	.36
Naugatuck	lb.	.33	.36
PX-917	lb.	.33	.36
Triphenyl phosphate, comml.	lb.	.39	.40
Monsanto	lb.	.415	.435
Turgum S	lb.	.111	.121
SB	lb.	.075	.085
Turpol NC 1200	lb.	.61	.70
Tysonite	lb.	.3025	.305
United	gal.	.69	1.20
X-1 Resinous Oil	lb.	.0225	.0325

Reclaiming Oils

Bardol, 639	lb.	.0275	.0375
B	lb.	.055	.065
BRH 2	lb.	.0213	.0351
BRT 3	lb.	.02	.031
4	lb.	.02	.031
7	lb.	.035	.036
BRV	lb.	.0625	.065
Burco-RA	lb.	.053	.0805
BWH-1	lb.	.16	.17
Dipolymer Oil	gal.	.33	.43
Dispersing Oil No. 10	lb.	.06	.0625
G. B. Oils	gal.	.115	.275
Heavy Resin Oil	lb.	.0225	.0375
LX-572	gal.	.27	.32
-759	gal.	.1375	
-777, -809, -859	gal.	.23	.33
-869	gal.	.33	.43
-871	gal.	.34	.44
No. 3186	gal.	.28	.295
Picco 6535	gal.	.25	.30
C-33	gal.	.215	.315
-42	gal.	.23	.33
D-4	gal.	.27	.37
E-5	gal.	.25	.35
Q-Oil	gal.	.286	.36
Pitt-Consol 500	lb.	.28	.305
640	lb.	.42	
PT 101 Pine Tar Oil	lb.	.038	.0554
Reclaiming Oil #3186	gal.	.28	.385
-G	gal.	.25	.365
4039-M	gal.	.3275	.3975
-Y	gal.	.30	.37
RR-10	lb.	.37	
S. R. O.	lb.	.015	.0225
X-1 Resinous Oil	lb.	.0225	.0325

Reinforcers, Other Than Carbon Black

Angelo Shellacs	lb.	$0.485	$0.7325
Borden, Chem. Div.			
Arcco 978-42B	lb.	.18	.19
1073-18B	lb.	.135	.145
1294-36B	lb.	.115	.125
1301-12B	lb.	.15	.16
BRC-20	lb.	.0235	.0245
22	lb.	.026	.0285
30	lb.	.0165	.025
521	lb.	.023	
Bunarex Resins	lb.	.065	.1225
Cab-o-sil	lb.	.66	1.45
Calcene CO	ton	105.00	125.00
NC	ton	80.00	100.00
TM	ton	82.50	102.50
Car-Bel-Rez C	lb.	.126	.1451
Clays			
Aiken	ton	14.00	
Buca	ton	45.00	
Burgess Iceberg	ton	50.00	80.00
Icecap K	ton	65.00	90.00
Burgess Pigment #20	ton	35.00	60.00
#30	ton	37.00	60.00
Catalpo	ton	35.00	
Crown	ton	14.00	33.00
Dixie	ton	14.50	
Franklin	ton	13.50	35.25
L. G. B.	ton	17.50	
McNamee	ton	14.50	
Par	ton	15.00	
Paragon	ton	14.50	33.00
Pigment No. 33	ton	37.00	
Polyfil C	ton	25.00	
Recco	ton	14.00	
Suprex	ton	14.50	33.50
Swanee	ton	12.50	
Whitetex	ton	50.00	
Windsor	ton	14.00	30.00
Witco No. 1	ton	14.00	30.00
No. 2	ton	13.50	30.00
Clearcarb	lb.	.1175	.1255
Cumar Resins	lb.	.065	.17
Darex Resins	lb.	.42	.49
DC Silica	lb.	1.15	1.40
Diatomaceous silica	ton	32.00	48.00
Good-rite 2007	lb.	.36	.38
2057	lb.	.30	.31
Hi-Sil 233	lb.	.0825	.0975
X303	lb.	.40	.45
Hycar 2001	lb.	.55	
2007	lb.	.39	
Indulins	lb.	.06	.08
Kralac A-EP	lb.	.43	.54
Laminar	ton	30.00	
Magnesium carbonate			
Marinco CL	lb.	.11	.14
Marbon Resins	lb.	.36	.43
Multifex MM	ton	117.50	137.50
Super	ton	167.50	187.50
Neville Resins			
465	lb.	.075	.08
LX-509	lb.	.33	.35
Nebony	lb.	.045	.05
Paradene	lb.	.07	.08
R	lb.	.145	.205
Para Resins 2457	lb.	.04	.045
Parapol S-Polymers	lb.	.44	
Picco Resins	lb.	.1275	.22
Piccolyte Resins	lb.	.205	.27
Piccoumaron Resins	lb.	.07	.195
Piccovars	lb.	.145	.20
Pliolite NR types	lb.	.98	1.33
S-3	lb.	.42	.49
-6	lb.	.36	.43
B	lb.	.36	.43
E	lb.	.36	.43
Plio-Tuf G85C	lb.	.52	.59
Purecal M	ton	56.75	71.75
SC, T	ton	110.00	125.00
U	ton	120.00	135.00
R-B-H 510	lb.	.15	.22
Resinex	lb.	.0375	.0525
Rubber Resin LM-4	lb.	.28	.35
Silene EF	lb.	.06	.07
L	lb.	.0575	.0675
Silvacons	ton	55.00	85.00
Transphalt	lb.	.0375	.0575
Witcarb P	ton	117.50	153.50
R	ton	127.50	163.50
Regular	ton	60.00	96.00
Zeolex 23	lb.	.06	.07
Zinc oxide, commercial†	lb.	.145	.155

Retarders

Benzoic acid TBAO-2	lb.	.44	
Good-rite Vultrol	lb.	.62	.66
R-17 Resin	lb.	.1075	.36
Retarder ASA	lb.	.57	
E-S-E-N	lb.	.39	.41
J	lb.	.68	.70
PD	lb.	.39	.41
W	lb.	.46	
Retardex	lb.	.47	.50
Thionex	lb.	1.14	
Wiltrol P	lb.	.37	.39

Solvents

Bondogen	lb.	.555	.605
Butyrolactone	lb.	.60	.65
Cosol #1	gal.	.37	.43
#2	gal.	.42	.48
Dichloro Pentanes	lb.	.04	.07
Dipentene DD, Sunny South	gal.	.42	.63
Ethylene dichloride, comml.	lb.	.09	.122

Hi-Flash 2-50-W	gal.	$0.41	
Pale yellow	gal.	.39	
LX-572	gal.	.27 /	$0.32
-748	gal.	.16 /	.23
Methyl-2-pyrrolidone	lb.	.75 /	.80
Neville Nos. 100, 104	gal.	.52 /	.60
106	gal.	.38 /	.46
Nevsolv H, 200	gal.	.19 /	.29
HF, T, 30	gal.	.24 /	.34
Penetrell	gal.	.42 /	.63
Picco Hi-Solv Solvents	gal.	.16 /	.48
Pine Oil DD, Sunny South	lb.	.15	
Skellysolve-B	gal.	.17	
-C	gal.	.162	
-H	gal.	.148	
-R, -V	gal.	.139	
Stauffer Carbon Disulfide	lb.	.0525/	.085
Tetrachloride	lb.	.0825/	.475

Tackifiers

Actinol DLR	lb.	.0625/	.085
Bardol, 639	lb.	.0275/	.0375
Borden, Arcco			
A25, A26, 716-30	lb.	.18 /	.19
555-40R	lb.	.185 /	.205
620-32B	lb.	.20 /	.21
716-35	lb.	.17 /	.18
1041-21	lb.	.165 /	.175
BRH 2	lb.	.0213/	.0351
Bunarex Resins	lb.	.065 /	.1225
Chlorowax 70	lb.	.18 /	.24
Contogums	lb.	.0875/	.11
Cumar Resins	lb.	.065 /	.17
Galex W-100	lb.	.155 /	.17
W-100D	lb.	.1525/	.1625
Indopol H-35	gal.	.65 /	.84
H-50	gal.	.70 /	.89
-100	gal.	.85 /	1.08
-300	gal.	1.00 /	1.24
-1500	gal.	1.48	
L-10	gal.	.40 /	.59
-50	gal.	.45 /	.64
-100	gal.	.55 /	.74
Kenflex resins	lb.	.18 /	.27
Koresin	lb.	.90 /	1.10
Natac	lb.	.12 /	.13
Nevindene	lb.	.15 /	.18
Picco Resins	lb.	.1275/	.22
Piccolastic Resins	lb.	.1855/	.34
Piccolyte Resins	lb.	.185 /	.25
Piccopale Resins	lb.	.089 /	.13
Piccoumaron Resins	lb.	.07 /	.185
R-B-H 510	lb.	.15 /	.22
Roelflex 1118A	lb.	.39	
Synthetic 100	lb.	.41	
Synthol	lb.	.17 /	.2625
United	gal.	.69 /	1.20

Vulcanizing Agents

Dibenzo G-M-F	lb.	2.60	
G-M-F #113, #117	lb.	.90	
Di-Cup	lb.	1.10	
Dodecenyl succinic anhydride	lb.	.75 /	.76
HMDA-Carbamate	lb.	4.50 /	4.90
Ko-Blend I, S	lb.	.39	
Litharge (*See Accelerator-Activators, Inorganic*)			
Magnesium oxide	lb.	.2525/	.38
Maglite D, K, Y	lb.	.2525/	.305
L	lb.	.2975/	.3225
M	lb.	.27 /	.32
Marmag	lb.	.2475/	.295
Michigan No. 1782	lb.	.2525/	.30
PSD 85	lb.	.37 /	.50
Red Lead (*See Accelerator-Activators, Inorganic*)			
Sulfasan R	lb.	1.55 /	1.57
Sulfur flour, comml.	100 lbs.	2.55 /	3.30
1018	lb.	.12 /	.1575
Aero	100 lbs.	2.40 /	7.75
Crystex	lb.	.195 /	.23
Insoluble 60	lb.	.125 /	.13
Rubbermakers	100 lbs.	2.65 /	4.55
Stauffer	lb.	.0265/	.054
Telloy	lb.	2.75	
VA-7	lb.	.50	
Vandex	lb.	7.50	
Vultac No. 2	lb.	.47 /	.74
3	lb.	.51 /	.78
White lead silicate (*See Accelerator-Activators, Inorganic*)			

Synthetic Rubbers

(*Continued from page 286*)

Cold SBR Oil-Black Masterbatch

Ameripol 1805	$0.155[c] /	$0.161[c]
4750	.1545[c]/	.1605[c]
4751	.140[c] /	.146[c]
4752	.160[c] /	.166[c]
4753	.148[c] /	.154[c]
Baytown 1801		.176[b]
Carbomix 3751, 3758	.1545[c]/	.1605[c]
3753, 3759	.164[c] /	.170[c]
3755	.147[c] /	.153[c]
3756	.1576[c]/	.1636[c]
3757	.148[c] /	.154[c]
Gentro-Jet 9250		.158
9251		.164
9252		.167
9275		.150

HELP WANTED!

We are now collecting and compiling the information for a new edition of "Compounding Ingredients for Rubber" and need your help in insuring complete listings.

Will you, therefore, please answer and return to RUBBER WORLD as soon as possible any questionnaires, corrections, additions, and/or deletions, we may send you relative to this matter.

If you do not hear from us shortly, will you please notify us so that your name may be added to our lists.

Your cooperation is greatly appreciated.

THE EDITORS.

OB-102		$0.1825[a]
-104		.1475[a]
-106		.151[a]
-110		.141[a]
-111		.154[a]
-113		.175[a]
-114C		.142[a]
Philprene 1803	$0.174[b] /	.18[b]
1805	.155[b] /	.161[b]
6604	.208[b] /	.214[b]
6608	.146[b] /	.152[b]
6620	.1545[b]/	.1605[b]
6661	.182[b] /	.188[b]
6682	.148[b] /	.154[b]
S-1803		.165[a]
-1804		.175[a]
Synpol 8250	.174[b] /	.18[b]
8253	.1584[b]/	.1644[b]
8254	.1545[b]/	.1605[b]
8255	.148[b] /	.154[b]
8266	.1598[b]/	.1658[b]

Cold SBR Rosin Masterbatch

Copo 3900	.231[c] /	.237[c]

Cold SBR Latex

CL-101		.28[a]
Copo 2101	.30[c] /	.4025[c]
2102, 2105, 2110, 3851	.32[c] /	.3725[c]
2108	.30[c] /	.3675[c]
2109	.2775[c]/	.3450[c]
3852	.2900[c]/	.3500[c]
FR-S 2105	.32[c] /	.366[c]
Naugatex 2105, 2107	.32[a] /	.38[a]
2108	.30[a] /	.38[a]
2113	.29[a] /	.36[a]
Pliolite Latex 2101		.30[c]
2105, 2107		.32[c]
2108		.30[c]
Polysar Latex 721		.32[c]
S-2101		.26[a]
-2105		.28[a]
-2107		.32[a]
-2108		.29[a]

Urethane Types

Adiprene L, LD-167,-213	1.15 /	1.65

Industrial Fabrics

(*Continued from page 285*)

more is noted, though on contract the older prices continue.

Industrial Fabrics

Drills*

59-inch, 1.85, 68x40	yd.	$0.385
2.25, 68x40		.325

Broken Twills*

54-inch, 1.14, 76x52	yd.	$0.52
58-inch, 1.06, 76x52		.585
60-inch, 1.02, 76x52		.5825

Osnaburgs*

40-inch, 2.11, 35x25	yd.	.2275
3.65, 35x25		.1525
59-inch, 2.35, 32x26		.295
62-inch, 2.23, 32x26		.305

Ducks

Numbered Duck†

List less 45%

Enameling Ducks*

	S. F	D. F.
38-inch, 1.78 yd.	$0.3263	.3313
2.00 yd.	.275	.28
51.5-inch, 1.35 yd.	.45	.47
57-inch, 1.22 yd.	.4838	.50
61.5-inch, 1.09 yd.	.5413	.5538

Hose and Belting Duck*

Basis	lb.	.60

Army Duck†

52-inch, 11.70 oz., 54x40 (8.10 oz./sq.yd.)	yd.	.5925

Sheeting*

40-inch, 3.15, 64x64	yd.	.2175
3.60, 56x56		.185
52-inch, 3.85, 48x48		.235
57-inch, 3.47, 48x48		.245
60-inch, 2.10, 64x64		.365
2.40, 56x56		.3275

Sateens*

53-inch, 1.12, 96x60	yd.	.6275
1.32, 96x64		.56
57-inch, 1.04, 96x60		.615
58-inch, 1.02, 96x60		.68
1.21, 96x64		.61

Chafer Fabrics*

14.40-oz./sq.yd. P.Y.	lb.	.71
11.65-oz./sq.yd. S.Y.		.61
10.80-oz./sq.yd. S.Y.		.65
8.9-oz./sq.yd. S.Y.		.67
40-inch, 2.56, 35x25		.25
60-inch, 1.71, 35x25		.435

* Net 10 days.

OBITUARY

Sid W. Richardson

Sid W. Richardson, founder of the Sid Richardson Carbon Co., Fort Worth, Tex., died in his sleep at his home on St. Joseph's Island in the Gulf of Mexico on September 30.

Mr. Richardson, who was one of the world's wealthiest men, had many other financial interests including those in oil, real estate, ranching, race tracks, and railroads. Much of his wealth was in the form of oil reserves underground. The oil business was his major activity.

He was born at Athens, Tex. April 25, 1891.

Mr. Richardson was educated at Baylor University and Simmons College.

He was interested in many charities, both public and private, and established the Sid Richardson Foundation.

Funeral services were held October 2 at the Broadway Baptist Church in Fort Worth.

A bachelor, the deceased is survived by two sisters, a niece, and a nephew.

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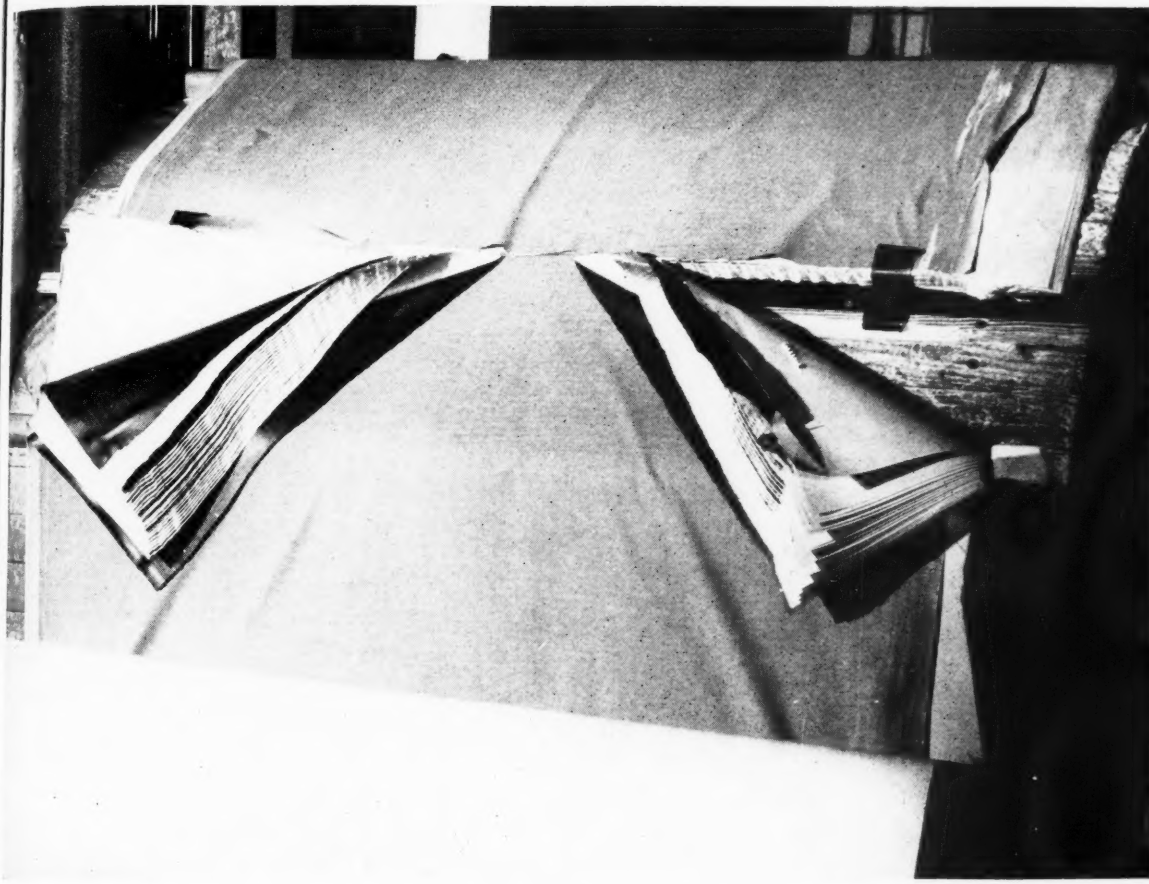

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